CALIFORNIA
ENERGY
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Report on the Future of the California Biomass Collaborative: Recommendations for Continuing Activity and Support

CONSULTANT REPORT

JUNE 2004
CEC-500-2004-903

Arnold Schwarzenegger, *Governor*

CALIFORNIA ENERGY COMMISSION

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Executive Summary

California enjoys a wide range of resources, including large amounts of biomass materials arising from a variety of activities such as forest-management practices, production of agricultural crops, production and management of livestock, and collection of municipal wastes. For the purposes of this discussion, biomass is material of plant and animal origin. As such, biomass is used in a range of primary products, e.g. lumber, paper products, food, and clothing, but also exists as secondary materials, some of which are used as boiler fuel, animal bedding, compost, soil amendments, and others. Still, much of the secondary biomass material is disposed in landfills or openly burned although both practices are subject to increasing curtailment.

The present challenge for California is to find sustainable and environmentally friendly ways of using biomass at a reasonable cost. The current estimate of biomass generated in California annually within the three principal categories of agricultural residues, forest residues and in-forest thinnings and chaparral, and municipal solid waste is 71 million dry tons[*]. Biomass produced in other terrestrial ecosystems and in aquatic and marine enviornments is not included in the estimate and could potentially add significant resource. Of the 71 million tons, 21 million tons are generated during agricultural production, 14 million tons is associated with forest land and practices (current and potential), and 36 million tons from municipal solid waste (MSW). In addition, dedicated biomass crop production may, in the future, provide new resources from agriculture and forestry for renewable energy and products.

The California Biomass Collaborative (Collaborative) was formed at the initiative of the California Energy Commission to coordinate development of biomass in California. It is composed of members from the California biomass industry; California Energy Commission and other state agencies; the University of California and National Laboratories; California energy suppliers; environmental groups; US federal agencies and programs; industry research and other groups or consultants including technology providers; related international programs; and professional societies and standards programs.

Mission Statement

> *The mission of the California Biomass Collaborative is to enhance the sustainable and effective use of biomass in the state of California.*

To fulfill this mission, the Collaborative administers a comprehensive statewide program in scientific research and innovation; technology development, demonstration and deployment; economic analysis; policy formulation; and education, training, and outreach. The Collaborative supports and integrates efforts of the State in advancing the state-of-knowledge and state-of-the-

[*] From "An Assessment of Biomass Resources in California" February 2004, California Biomass Collaborative.

art in efficient, safe, reliable, affordable, and environmentally sound bioenergy, bioproducts, and other biomass systems. The Collaborative relies on close cooperation of representatives of the State of California, its universities and academic institutions, the state's biomass and energy industries, environmental organizations, agencies and laboratories of the federal government, and other organizations and institutions. Goals of the Collaborative are:

Goal 1: Improve the understanding of how biomass can be used in sustainable and effective ways
Goal 2: Improve the understanding of both the driving forces and the barriers to enhancing the use of biomass
Goal 3: Contribute to the development of policies and practices promoting the sustainable and effective use of biomass
Goal 4: Assist decision makers in the evaluation or development of biomass technologies.
Goal 5: Inform and educate the public, state government, and other interested parties and support technical education and training.

Proposed Efforts

The Collaborative will undertake the efforts listed below to achieve its mission. These efforts are grouped in the categories of Policy, Research, and Outreach. There is also the financial viability of the Collaborative to maintain. The last section, Funding**,** addresses this issue.

Policy

To address the concern over the lack of a coherent state policy on biomass utilization, consistent strategies specific to biomass should be integrated into the State's policies governing energy, agriculture, waste management, air quality, and economic development. To achieve that end, the Collaborative shall conduct policy analyses that incorporate earlier research quantifying the social and economic benefits realized by biomass utilization; identify major barriers within state and federal statute and regulation; and propose possible remedies. In addition, the Collaborative can help define strategies to reduce unproductive disposal. Greater detail can be obtained from the January 2004 report of the CBC Policy Committee.

The Collaborative will prepare briefing papers for members of the state legislature as an informational or background document. The briefing papers will include: (1) identification of the quantifiable social and economic benefits that offset the higher costs for biomass; (2) development of state policy supporting the sustainable production of bio-based fuels, electricity, and bio-products from biomass; (3) provisions for making existing state renewable energy and waste management policies consistent; and (4) creation of financial incentives to sustain the industry.

Research

The Collaborative proposes the following research tasks:

- Develop and maintain an improved database of biomass resources;
- Conduct detailed technology or site-specific economic analyses and assessments to serve as case studies;
- Invite stakeholder input, assess potential drivers and barriers to alternative technologies;

- Participate in the preparation of standards and standard practices relating to the properties and products of biomass technologies, and to the design and operation of biomass conversion systems;
- Develop and disseminate general biomass-technology and system-analysis tools including economic, environmental, and risk assessment tools; and
- Coordinate with federal and other efforts on biomass related research and development.

Outreach

The Collaborative will establish an outreach program to bring issues of biomass management to state agencies, industry, the public, and members of the State Legislature and its staff.

The Collaborative shall publish a quarterly newsletter informing the membership and public of Collaborative activities and other items of interest. Planned forums and workshops will also be advertised in the newsletter. The white papers prepared by the Collaborative on policy, research, and other issues will also be distributed to the membership through the Collaborative's website. The Collaborative will implement an outreach program to inform the public, impacted communities, and K-12 schools on biomass technologies, industries, and policies and to overcome barriers to meaningful participation in the decision-making process.

Funding

The Collaborative will work under a five-year plan that is updated every two years. The following is a brief outline for the five-year plan and the proposed initial two-year plan.

- Policy Objectives –recommendations regarding how the state might work toward establishing a coherent State policy on biomass use, ensuring consistent permitting and standards, providing accurate quantification of benefits, working toward a broader renewable energy policy for the state; establishing fuel-preference criteria and renewable energy criteria;
- Research Proposals – setting forth proposals and developing specific research activities to be conducted by the Collaborative based on identified priorities and specific program targets;
- Education and Outreach Program – conducting forums, workshops, and hearings, providing training, establishing and maintaining websites, and publishing and distributing newsletters and papers;
- Local Decision Maker Support – providing local decision makers with information, references and methodologies for evaluating biomass alternatives, conducting technology demonstrations and recommending testing strategies;
- Financial Support Mechanisms – Pursuing federal, state, and private grant and contract funding for the Collaborative's programs.

Introduction

California's increasing population, coupled with competing demands for energy, better environmental protection, environmental justice, and a higher quality of life are prompting a greater awareness of the need for improved management of the state's natural resources. California enjoys a wide range of resources, including large amounts of biomass materials arising from a variety of activities such as forest-management practices, production of agricultural crops, production and management of livestock, and collection of municipal wastes. For the purposes of this discussion, biomass is material of plant and animal origin. As such, biomass is used in a range of primary products, e.g. lumber, paper products, food, and clothing, but also exists as secondary materials, some of which are used as boiler fuel, animal bedding, compost, soil amendments, and others. Still, much of the secondary biomass material is disposed in landfills or openly burned although both practices are subject to increasing curtailment. Often, disposal at the least cost to the individual can result in costly consequences to the environment and public health, with residual biomass management practices polluting the land, air, and water.

The present challenge for California is to find sustainable and environmentally friendly ways of using biomass at a reasonable cost. The current estimate of biomass generated in California annually within the three principal categories of agricultural residues, forest residues and in-forest thinnings and chaparral, and municipal solid waste is 71 million dry tons[†]. Of that amount, 21 million tons are generated during agricultural production, 14 million tons is associated with forest lands and practices (current and potential), and 36 million tons from municipal solid waste (MSW). The latter includes 18 million tons of biomass disposed in landfills and 18 million tons of biomass diverted to energy, recycling, composting, and other purposes, but which could compete in other bioenergy and bioproduct markets. Of the 60 million dry tons of MSW generated each year, 60% is biomass. In addition, dedicated biomass crops may, in the future, provide new resources from agriculture, forestry, and aquaculture for renewable energy and products.

Biomass Inventory	
Agricultural Biomass:	21 million tons/year
orchard and vineyard	
field and seed	
vegetable	
food and fiber processing	
animal manures	
Forestry Biomass:	14 million tons/year
fuels reduction/slash	
lumber mill residues	
chaparral	
Municipal Solid Waste:	36 million tons/year
biomass fraction of MSW	
wastewater	
bio-solids	

[†] From "An Assessment of Biomass Resources in California" February 2004, California Biomass Collaborative.

Biomass-to-energy conversion programs, biorefineries, and other bioproducts manufacturing and production can provide sustainable and effective uses of residual biomass. Achieving gains from these technologies will require close cooperation and coordination among biomass industries, government agencies, environmental groups, electricity distributors and suppliers, and academic institutions conducting research, education, training, and outreach. The California Biomass Collaborative has been formed to help coordinate that effort.

California Biomass Collaborative

The California Biomass Collaborative (Collaborative) is composed of members from the California biomass industry; California Energy Commission and other state agencies; the University of California and National Laboratories; California energy suppliers; environmental groups; US federal agencies and programs; industry research and other groups or consultants including technology providers; related international programs; and professional societies and standards programs.

The Collaboration provides statewide coordination of biomass research, policy, and communication activities including: resource inventory and generation assessments; facility performance reporting and evaluations; technology research, development, demonstration, and deployment; economic analysis and modeling; policy issues and implications; standards; education and training; extension and public outreach.

The Collaborative initially engaged in a series of information gathering efforts. In its first year, the Collaborative reviewed and updated biomass inventory data within the state. The resource assessments also estimate gross and technical electrical generation potentials from biomass and make projections for biomass quantities into the future. Also, the Collaborative has developed a GIS database that links to the resource data with current and planned facilities biomass facilities. A survey of existing biomass facilities is ongoing which is intended to improve understanding of the current state of the industry. The Collaborative is reviewing the state of biomass power generation in California and is conducting a review of the situation in Europe.

The Collaborative hosted an open Forum in January 2004 at which preliminary findings were presented for review and comment. The forum was well attended (with approximately 200 participants) and included a variety of speakers including Commissioner James Boyd of the Energy Commission, Secretary of the California Environmental Protection Agency Terry Tamminen and Secretary of the Department of Food and Agriculture A.G. Kawamura, as well as industry, environmental community, and legislature committee representatives.

This report defines the mission of the Collaborative following its inception and makes recommendations concerning possible future efforts.

Vision: *Biomass resources are sustainably developed, managed, and used for the effective production of renewable energy, materials, and products.*

Mission Statement

The mission of the California Biomass Collaborative is to enhance the sustainable and effective use of biomass in the state of California.

To fulfill this mission, the Collaborative administers a comprehensive statewide program in scientific research and innovation; technology development, demonstration and deployment; economic analysis; policy formulation; and education, training, and outreach. The Collaborative supports and integrates efforts of the State in advancing the state-of-knowledge and state-of-the-art in efficient, safe, reliable, affordable, and environmentally sound bioenergy, bioproducts, and other biomass systems. The Collaborative relies on close cooperation of representatives of the State of California, its universities and academic institutions, the state's biomass and energy industries, environmental organizations, agencies and laboratories of the federal government, and other organizations and institutions.

Statement of Goals

Following are goals of the collaborative in carrying out its mission. The goals are intended to help achieve in the state a strong and healthy market for biomass in the production of sustainable, renewable, and economically competitive energy, materials, and products.

Goal 1: Improve the understanding of how biomass can be used in sustainable and effective ways.

Strategies	Tasks	Deliverable
Research and investigate technologies, systems, and impacts.	Develop and maintain improved biomass resource data and carry out the Collaborative's research agenda.	Biomass Facilities Reporting System, Biomass Resource Assessment.
Quantify the benefits and costs of biomass utilization.	Conduct detailed and site-specific analyses to serve as case studies. Perform broader assessments to evaluate statewide economic and social impacts.	Case studies, White papers, Briefing papers
Provide for innovation.	Propose new research and development initiatives. Work with funding sources to define objectives and means to achieve them.	Research proposals. Participation in RDD&D projects.

Goal 2: Improve the understanding of both the driving forces and the barriers to enhancing the use of biomass.

Strategies	Tasks	Deliverable
Determine possible drivers to increase the use of biomass and identify barriers facing existing biomass producers and users.	Survey/interview biomass producers and users, policy makers, and other stakeholders. Assess industry needs. Evaluate current and proposed federal, state, and local policies.	Needs Assessments, white papers, and briefing papers.
Evaluate drivers and alternatives to overcoming barriers.	Invite stakeholder input, assess potential impacts and outcomes of alternatives.	Conferences and workshops.

Goal 3: Contribute to the development of policies and practices promoting the sustainable and effective use of biomass.

Strategies	Tasks	Deliverable
Inform and educate decision makers in government and industry.	Prepare reports of Collaborative studies, assessments, and recommendations. Conduct workshops, hearings and forums, present and publish research results, and maintain website for the public dissemination of relevant information.	Reports, White papers, Website, Workshops, Conferences, Forums.
Proactively participate in the development of sustainable use policies.	Participate in joint agency and state taskforces and other workgroups, bring stakeholders together, explore and provide recommendations for incentives.	Taskforces, Workshops, Sustainable use policy recommendations
Proactively participate in the development of effective standards and practices affecting biomass utilization.	Participate in the preparation of standards and standard practices relating to properties and products of biomass, and the design and operation of biomass conversion systems. Identify needs for new standards and provide recommendations.	Standards, regulations, and practices.

Goal 4: Assist decision makers in the evaluation or development of biomass technologies.

Strategies	Tasks	Deliverable
Provide local decision makers access to information.	Assist in local resource and technology assessments, provide methodology, data, and access to Collaborative databases for independent site and technology evaluations by local decision makers.	Databases, Technology assessment models.
Provide decision-making support.	Develop and disseminate general biomass technology and system-analysis tools including economic, environmental, and risk assessment models. Provide references and services to appropriate state and local agencies, personnel, and decision makers involving regulation, siting, permitting, and other biomass project development.	Risk Assessment models, Case studies, Siting studies, Technology deployment.
Proactively participate in technology demonstrations.	Provide independent technical review, conduct or assist in conducting technology demonstrations, recommend testing strategies and plans.	Technology demonstrations, Test methods and plans.

Goal 5: Inform and educate the public, state government, and other interested parties and support technical education and training.

Strategies	Tasks	Deliverable
Act as an information clearinghouse	Maintain website for information dissemination, perform literature searches, conduct public workshops and hearings.	Website, Surveys, Workshops.
Provide public outreach	Support and cooperate on UC extension efforts, conduct public workshops, prepare and distribute newsletters and other information items.	Workshops, Newsletters.
Support development of educational and technical training programs	Develop K-12 educational materials and curricula, contribute to the establishment and development of training programs.	K-12 curricular materials, contributions to training programs

Forum Survey

A survey was conducted of the participants at the Collaborative's January 8, 2004 Forum. The 200 participants were asked to rank various issues and options facing the biomass industry according to their importance. The survey covered policy and research issues including:

- possible impediments and opportunities facing the continued use or expansion of biomass;
- potential financial incentives for expanding the use of biomass;
- primary policy objectives for the Collaborative; and
- technical and social or economic areas that need to be researched.

Independent comments and suggestions were also solicited. Approximately 68 completed surveys were turned in. While not necessarily a statistically robust sampling, the results give an indication of the membership's concerns. The appendix contains a summary of survey data and results with the rankings given by the participants averaged and graphically displayed.

Forum policy survey group composition by occupation

Actual No. of Surveys	68

Self Reported Affiliations	Frequency
Researcher	23
For Profit Organization	18
Government	18
Non Profit Organization	16
Planning a Facility	12
Producer	12
Residential Consumer	12
Public Policy	10
Supplier	8
Currently Operating Facilities	7
Business Customer (consumer?)	4
Other*	3
Educator	0

* Survey 5 - Utility
* Survey 24 - CHP organization
* Survey 37 - Electric utility planning biomass facilities

Participants were asked to select the top three issues in each category. Listed below are the top-ranked concerns.

> Of the impediments considered in the survey, participants ranked the three highest as: (1) "lack of state policy on bio-based fuels, power and products"; (2) "lack of quantifiable financial benefit to offset higher costs for biomass"; and (3) "unequal treatment of biomass within existing renewable energy policies. "

Participants ranked the top opportunities as: (1) "Fire hazard mitigation in wildlands and urban interface"; (2) "Diversion of waste from landfills"; and (3) "California Renewable Portfolio Standard" (RPS).

Top "Incentives" were: (1) "Grants, loans or rebates to producers"; (2) "Loan Guarantees to producers and suppliers"; and (3) "tradable tax credits."

Top "Policy Objectives" were: (1) "establish a platform for industry, academia, government, and others to work together on issues relating to biomass"; (2) "determine regulatory and policy changes necessary to remove barriers to a sustainable biomass system"; and (3) "promote research and transfer of technologies related to bio-based fuels, power and products".

Top "Research Areas" were: (1) "Demonstrate ethanol production from cellulosic biomass"; (2) "Develop better methodologies to account for social and economic benefits"; (3) "Expand use of biogas (new feedstocks, new energy conversion technologies"; and (4) "Develop small portable conversion units."

Issues ranked lower were: conflict between performance standards vs. technology standards; workforce and labor issues; personal income tax benefits; recommendations of the Energy Action Plan; and enhanced opportunities for urban revitalization and brownfields redevelopment.

Written comments included:

- Municipal Solid Waste Issues - expand applicability of waste diversion credit; restrict biomass from disposal in landfills; change AB939 definition of conversion technology; and remove biomass from CIWMB regulation.
- Air Quality Issues – provide emission offset credits; support reformulated (oxygenate) fuels; develop carbon emissions reductions and policy; and provide relief from NOx regulations for landfill gas.
- Benefits – the state should recognize the multiple benefits (wildfire control, petroleum displacement, waste diversion, air quality improvements) provided by biomass industries; and state should provide credits, incentives or financial compensation for biomass.
- Financial Issues – improve standard offer contracts; establish purchasing requirements; provide direct subsidy for forest thinning and closed-cycle tax credit; improve Renewable Portfolio Standard; and conduct cost-benefit and life-cycle analyses.
- Permitting – resolve state and local permit conflicts; lighten CEQA process, environmental justice review, and SWFP requirements; and establish one-stop permitting authority.
- Utility/intertie Issues – renegotiate long-term energy contracts; ease interconnection, wheeling, and net metering; and improve power grid regulation.
- Handling and Supply – allow storage of biomass at landfills; harvest small diameter trees for fuel; avoid over-reliance on any single source of materials; and allow time for agriculture to develop functional systems.
- Labor – reform workers compensation laws; solid waste disposal labor; and create jobs in ex-lumber mill towns.

Overall, the survey responses give a strong signal that all elements of the Collaborative feel that California lacks a coherent state policy supporting the biomass industries, that some form of financial support will be needed for at least the short-term, that the environmental and societal benefits must be quantified accurately to justify the needed support, further research and development will help the industry evolve, and a platform such as the Collaborative is a viable way to achieve these goals.

Although this was only an informal survey, the results do indicate the current thinking of interested parties and stakeholders present at the Forum. The top-ranking issues present a coherent picture of an industry feeling very much out of the consciousness of state policy makers. A 'top impediment' is related to the fact that biomass utilization imparts societal benefits that currently are not monetized so there is no economic benefit paid to the provider of this service. One of the most important research areas identified is to develop better methodologies to account for these social benefits.

Benefits are realized through managing or removing excess fuel from the state's forests, thereby reducing the threat of wild fires; diverting organic materials such as contaminated paper and cardboard, grease-trap wastes, and clean construction and demolition residues from landfills, thereby freeing landfill capacity for non-recyclable wastes; finding markets for agricultural by-products such as straw, wood, sugars, and oils in the energy, construction, chemical, and other bioproducts industries, thereby avoiding the need for open burning; and displacing fossil fuels and feedstocks, thereby improving carbon management and reducing reliance on petroleum and fossil fuels. There is a clear need for the Collaborative to compile convincing evidence of the many social and economic benefits provided to California by the biomass industry to elicit support at the highest levels of government.

The quantification of the benefits would be used to educate state policy makers in the needs and benefits of the biomass industry. Findings could be presented at educational workshops and legislative hearings. The Collaborative should then pursue specific regulatory support for all segments of the biomass industry by championing programs such as mandated state-agency purchase-preferences for a variety of biomass power and products; seeking expanded renewable portfolio and fuel standards for electricity and fuels producers; promoting tax credits; and increasing availability of low-interest loans. On an ongoing basis, a variety of research projects should be undertaken to continually improve the technologies used to capture the value inherent in biomass and improve our understanding of their impacts.

The survey results give the Collaborative an indication of issues to pursue in the near-term. Additional surveys or questionnaires should be distributed for a broader assessment of member concerns.

Proposed Efforts

The Collaborative will undertake the efforts listed below to achieve its mission. These efforts are grouped in the categories of Policy, Research, and Outreach. There is also the financial viability of the Collaborative to maintain. The last section, Funding**,** addresses this issue.

Policy

To address the concern expressed by members over the lack of a coherent state policy on biomass utilization, strategies specific to biomass should be integrated into the State's policies governing energy, agriculture, waste management, air quality, and economic development. To achieve that end, the Collaborative shall conduct policy analyses that incorporate earlier research quantifying the social and economic benefits realized by biomass utilization; identify major barriers within state and federal statute and regulation; and propose remedies. In addition, the Collaborative can help define strategies to reduce the unproductive disposal of biomass. Greater detail can be obtained from the January 2004 report of the CBC Policy Committee.

The Collaborative enlisted members of the Executive Board to form a policy committee to explore the institutional and policy changes necessary to ensure the development and viability of biomass industries in California. The committee defined "biomass industries" to include a diverse platform of industrial operations that convert biomass materials into renewable sources of power, fuels, chemicals, and other bio-based products. Barriers to the development of biomass industries include: fragmented State environmental policies and programs; overlapping regulation and permitting requirements by different agencies; lack of a system to quantify or assess benefits from biomass industries; competition with vested utility, fuel, and waste management infrastructures; a lack of distinction within the current RPS between intermittent and baseload renewable power in terms of the system operation and benefits, and a lack of public awareness and advocacy.

The Collaborative can make recommendations regarding policy changes to pursue such as enhancing the biomass power role in the RPS; quantifying and monetizing values associated with environmental benefits; streamlining permit review and regulation; coordinating a state agency biomass working group; modifying regulations pertaining to fuels; establishing state and local government purchasing mandates; establishing tax or other economic incentives for growers and manufacturers; and educating the public. The State needs to remain aware of policy and technology advances occurring worldwide and not fall behind as other countries move to implement provisions of the Kyoto treaty, greenhouse gas reductions and carbon sequestration.

Recommendations and findings of the assessments will be compiled in a series of topical briefing papers for presentation to state agencies and other relevant organizations and institutions. The Collaborative will also prepare a position paper for members of the state legislature as an informational or background document. The position paper will include: (1) identification of the quantifiable social and economic benefits that offset the higher costs for biomass; (2) development of a state policy supporting the sustainable production of bio-based fuels, electricity, and bio-products from biomass; (3) provisions for making existing state renewable energy and waste management policies consistent; and (4) creation of financial incentives to sustain the industry.

Research

Recommendations by the Collaborative's Research Committee and results from the Forum surveys provide suggestions for possible research efforts to be undertaken. The committee laid out its proposals split between short, medium, and long-term efforts.

Short-term

Short-term objectives proposed by the Committee include:

- examine ways to improve efficiencies, reduce costs, and improve environmental benefits, where possible;
- investigating direct co-firing of solid biomass in existing coal-fired plants;
- co-firing gasified biomass, digester gas or landfill gas with natural gas in boilers;
- using bio-diesel or bio-oils in small distributed power generation units: and
- investigating improved environmental controls using downstream gas clean-up, low-NOx burners, and improvements in coal and gas combustion.

Medium-term

Medium-term projects proposed by the Committee include:

- demonstrating biomass gasification systems for co-firing in existing natural-gas-fired industrial-turbine power plants and integrated gasification combined cycle concepts; and
- designing small, portable biomass-conversion units for location near biomass sources or electric substations to produce fuels or electricity.

Long-term

The Committee recommended that the Collaborative's long-term research efforts should focus on implementing bio-refinery concepts based on either thermochemical (e.g. syngas) or biochemical (fermentation) processes to produce multiple end products with higher overall value.

Research Survey Recommendations

Participants at the January Forum rated of highest importance projects to:

- demonstrate ethanol production from cellulosic biomass;
- develop better accounting of social and economic benefits;
- expand uses of biogas through new feedstocks and new technologies;
- improve in-field harvesting and processing technologies; and
- reduce the costs of harvesting and transporting forest residues.

Additional detail is provided in the appendix.

To accomplish the above goals, the Collaborative proposes at least the following tasks:

- Develop and maintain an improved database of biomass resources;
- Conduct detailed, technology or site-specific economic analyses and assessments to serve as case studies;

- Invite stakeholder input, assess potential drivers and barriers to alternative technologies;
- Participate in the preparation of standards and standard practices relating to the properties and products of biomass technologies, and to the design and operation of biomass conversion systems;
- Develop and disseminate general biomass-technology and system-analysis tools including economic, environmental, and risk assessment tools; and
- Coordinate with federal and other efforts on biomass related research and development.

California's existing biomass-conversion facilities operate within strict permit limits set by state and local environmental agencies; however, environmental standards are regularly being overhauled and tightened. To meet the demands of potential new, more stringent requirements, the Collaborative will investigate applicability of retrofit technologies for existing facilities.

The Collaborative is already engaged in proposals to address research objectives and will continue to respond to solicitations. Depending upon allocation of resources, additional medium or long-term efforts will be undertaken. The Collaborative will continue to investigate new and innovative research topics and pursue funding to support on-going research efforts.

Outreach

The Collaborative will establish an outreach program to bring issues of biomass management to state agencies, industry, the public, and members of the State Legislature and its staff.

The Collaborative shall conduct an outreach program to the California Public Utilities Commission, California Energy Commission, California Department of Food and Agriculture, the California Environmental Protection Agency, and other involved agencies. Feedback from agencies will be incorporated into the Collaborative's position papers. In addition, research results and reports will be presented to support recommendations of the Collaborative.

The Collaborative shall publish a quarterly newsletter informing the membership and public of Collaborative activities and other items of interest. Planned forums and workshops will also be advertised in the newsletter. Briefing papers prepared by the Collaborative on policy, research, and other issues will also be distributed to the membership through the Collaborative's website. The Collaborative will implement an outreach program and assist with UC and other extension activities to inform the public, impacted communities, and K-12 schools on biomass technologies, industries, and policies and to overcome barriers to meaningful participation in the decision-making process.

Funding

The Collaborative will work under a five-year plan that is updated every two years. The following is a brief outline for the five-year plan and the proposed initial two-year plan.

Five year plan:

The Collaborative shall prepare a five-year financial plan laying out program activities to be undertaken to advance the development of biomass in California and the funding mechanisms to pursue support of those activities. The plan shall describe the status of the industry, and specific

goals, objectives, and tasks for the proposed activities during the funding period. Multiple funding sources at the federal, state and local levels shall be pursued for individual projects or components of the plan. The initial two years of operation will be described in greater detail to serve as the basis for the continuation proposal for the Collaborative to the California Energy Commission. The five-year plan will be revised every two-years and include an evaluation of the Collaborative's performance in the preceding two years.

Two year plan:

The detailed two-year plan shall describe specific research projects and informational efforts to be undertaken by the Collaborative for fiscal years 2004/05 and 2005/06. The mission statement's goals and strategies will be addressed in detail. The plan will include, at a minimum, detailed descriptions of the following elements:

- Policy Objectives – recommendations as to how the state might work toward establishing a coherent State policy on biomass use, ensuring consistent permitting and standards, providing accurate quantification of benefits, working toward a broader renewable energy policy for the state; establishing fuel-preference criteria and renewable energy criteria;
- Research Proposals – setting forth proposals and developing specific research activities to be conducted by the Collaborative based on identified priorities and specific program targets;
- Education and Outreach Program – conducting forums, workshops, and hearings, providing training, establishing and maintaining websites, and publishing and distributing newsletters and papers;
- Local Decision Maker Support – providing local decision makers with information, references and methodologies for evaluating biomass alternatives, conducting technology demonstrations and recommending testing strategies;
- Financial Support Mechanisms – Pursuing federal, state, and private grant and contract funding for the Collaborative's programs.

The report structure will include the following subject areas: state of the industry; identification of need; overall Collaborative goals and objectives; scope of work (technical task list, timeline, key name list, and staffing requirements); technical and economic performance objectives; measurement criteria; structure of the organization (including Executive Board); and a two-year budget (salaries, supplies, travel, subcontractors, equipment and indirect costs) including any cost sharing by private parties and research grant support.

California Biomass Collaborative
Report of Future Recommendations

APPENDIX

Forum Policy Survey and Research Survey Results

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Forum Policy Survey and Research Survey Results

Surveys on research needs and policy issues facing the biomass industry were taken of participants at the January 8, 2004 Forum of the California Biomass Collaborative. In the Policy Survey, the audience was asked to list priorities for a series of issues in four categories. Issues were to be listed from 1 (high) to 5 (low). In addition, participants were asked to select their top three issues in each category. The categories were:[1]

- **I Greatest Impediments to Continued Use and Expansion of Biomass**
- **II Financial Incentives**
- **III Opportunities for the Continued Use and Expansion of Biomass Fuels, Power and Products**
- **IV Primary Policy Objectives of the Collaborative**

Participants were encouraged to provide comments on any additional issues not covered in the survey and to provide information identifying themselves. Sixty eight policy surveys and 65 research surveys were received by the end of the day. The composition of the surveyed group is exhibited in Table A1 according to the self-reported occupations choices that were listed in the survey. Because respondents were asked to select all occupation or affiliation categories that applied to them, the totals of all groups sum to more than the number of surveys.

Table A1 - Forum policy survey group composition by occupation

Actual No. of Surveys	68
Self Reported Affiliations	**Frequency**
Researcher	23
For Profit Organization	18
Government	18
Non Profit Organization	16
Planning a Facility	12
Producer	12
Residential Consumer	12
Public Policy	10
Supplier	8
Currently Operating Facilities	7
Business Customer (consumer?)	4
Other*	3
Educator	0

* Survey 5 - Utility
* Survey 24 - CHP organization
* Survey 37 - Electric utility planning biomass facilities

[1] A copy of the surveys appear at the end of this Appendix

The survey results have been compiled and analyzed. The following tables give information on the average score (using the rating of 1 high, 5 low yields a highest rated issue as having the lowest numerical score); the frequency or number of times a particular issue was ranked either 1 or 5; the number of surveys responding to that category; the number of surveys that did not provide a ranking for that particular issue; and the number of times an issue was ranked in the top three.

Following each category table, are graphs of selected results. The first graph(s) for each category displays the average score of each issue broken out by each of seven segments of the audience (broken out for the Policy survey only - the research survey did not ask for occupation/affiliation.) For ease of reading, the level of importance displayed in these graphs is the transform of the average score for the 1-high, 5-low system used in the survey. The separate groupings chosen for group-averaged plotting are listed in Table A2. The Producers, Suppliers, and 'For-Profit Organization' groups were combined into one for plotting (because respondents were asked to choose all occupation types that applied, there were some duplications when combining these three groups. The duplications were removed before plotting.). The Residential and Business Customer groups were not plotted because the data were not relevant and the Educator and Other category had too few respondents to be meaningful. Because the first category of "Impediments" has 18 separate issues, the graphing of the average scores has been displayed individually for each group and compared to the global average. The second graph displays the top three picks.

Table A2. Self-selected groups used for individual plotting and number in group. (Policy Survey)

Groups plotted individually	No. in Group
Producers/Suppliers/forProfit	23
Government	18
Currently Operating	7
Non Profit	16
Plannig Facility	12
Public Policy Analyst	10
Researcher	23

Not Plotted as a group:
Residential Consumer
Business Customer (consumer?)
Other*
Educator

* Survey 5 - Utility
* Survey 24 - CHP organization
* Survey 37 - Electric utility planning biomass facilities

Table A3 - Policy Survey Section I : Greatest Impediments to Continued Use and Expansion of Biomass

	Issue	Average Score (1=high) (5=low)	Number of Highest (1) Agreement	Number of Lowest (5) Agreement	Number of Surveys	Number of No Responses	Number of times as "Top Three"
1	Inconsistent State Regulatory Requirements	2.2	18	6	62	15	9
2	Inconsistent Federal Regulatory Requirements	2.7	10	6	62	18	2
3	State/Federal Regulations Are Inconsistent With Each Other	2.5	10	4	62	18	3
4	Unequal Treatment of Biomass in Renewable Energy Policy	2.0	14	1	62	10	9
5	State Environmental Permitting	2.2	15	2	62	14	9
6	Local Siting & Use Issues	2.3	14	0	62	12	1
7	Feedstock Transport	2.9	11	6	62	12	2
8	Access to Working Capital	2.6	12	4	62	12	9
9	Access to Credit	2.7	12	7	62	14	5
10	Workforce/Labor Issues	4.2	1	21	62	16	0
11	Lack of New and-or Improved Technologies	2.8	13	9	62	10	8
12	Interconnection - Grid & Facilities	2.5	16	5	62	11	8
13	Market Acceptance and/or Public Education	2.7	10	7	62	12	2
14	Lack State Biomass Policy	1.7	28	1	62	8	19
15	Performance vs Technology Stds.	3.5	3	13	62	13	1
16	Lack of Quantifiable Financial Benefit to Offset Higher Costs	1.8	30	2	62	7	15
17	State Procurement Policies	2.8	11	8	62	16	2
18	Access to Feedstock & Fuels	3.0	10	10	62	10	2

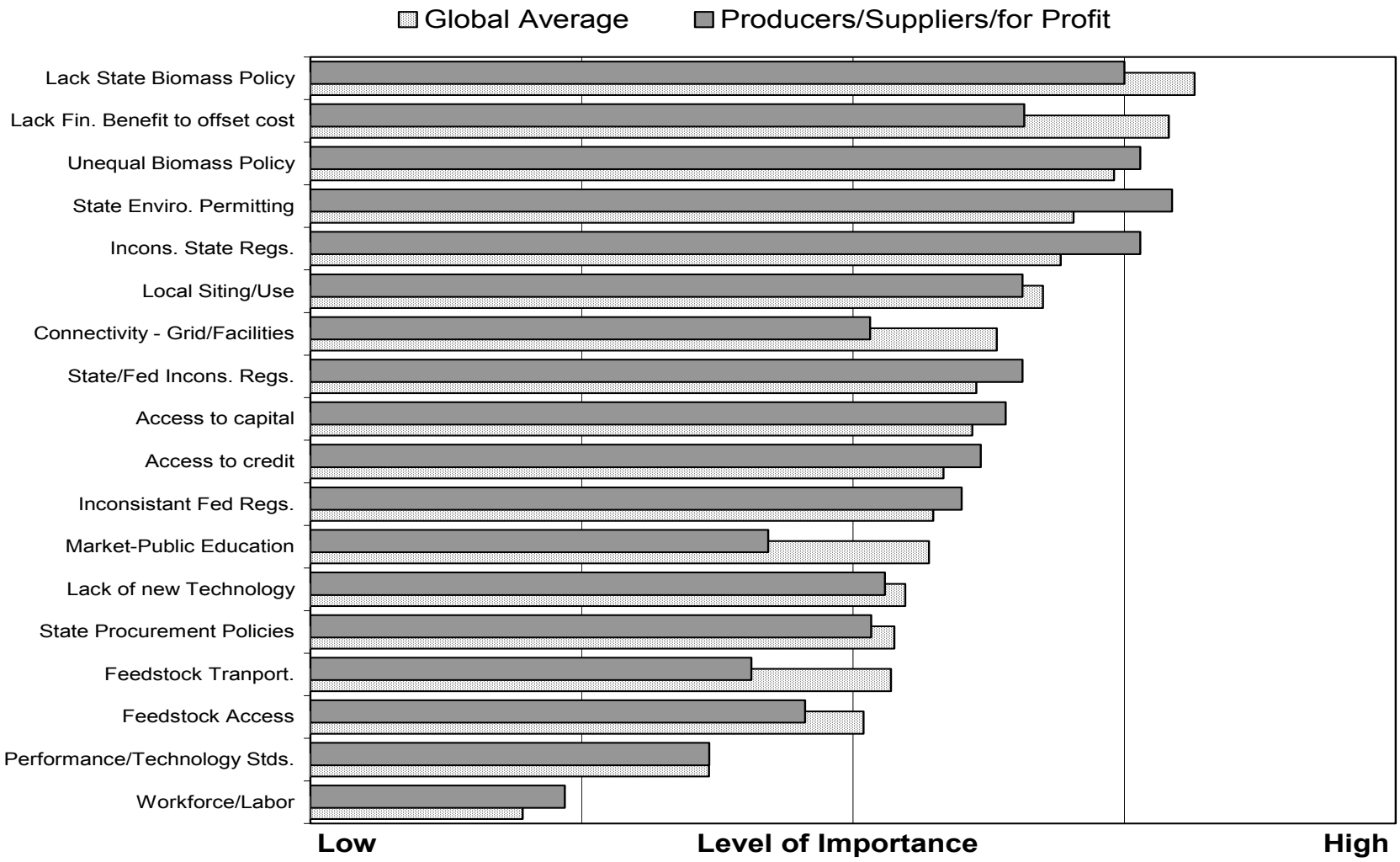

Figure A1. Policy Survey: Impediments - Rating - Producer/Suppliers/for Profit group against Global Average

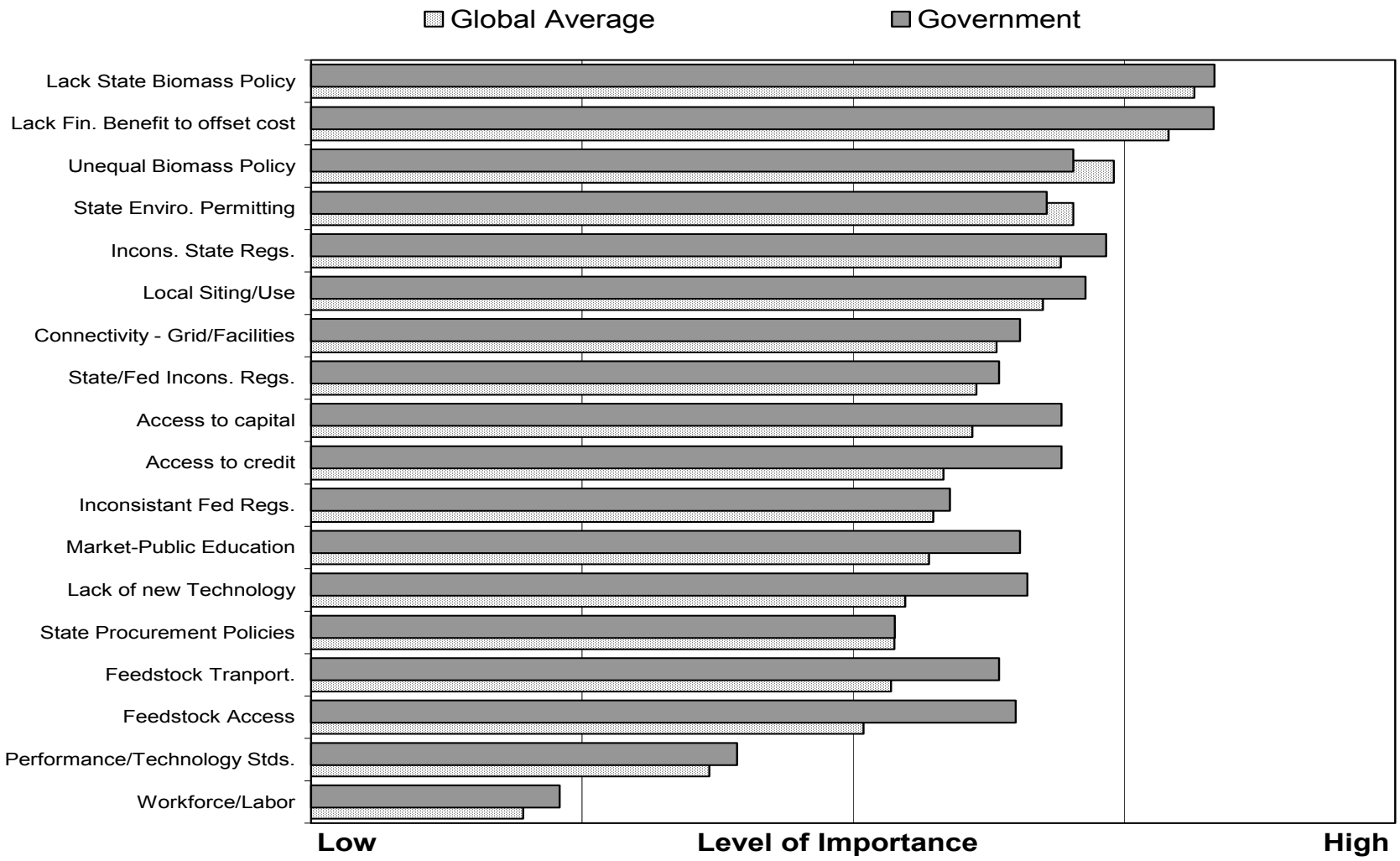

Figure A2. Policy Survey: Impediments - Rating- Government group against Global Average

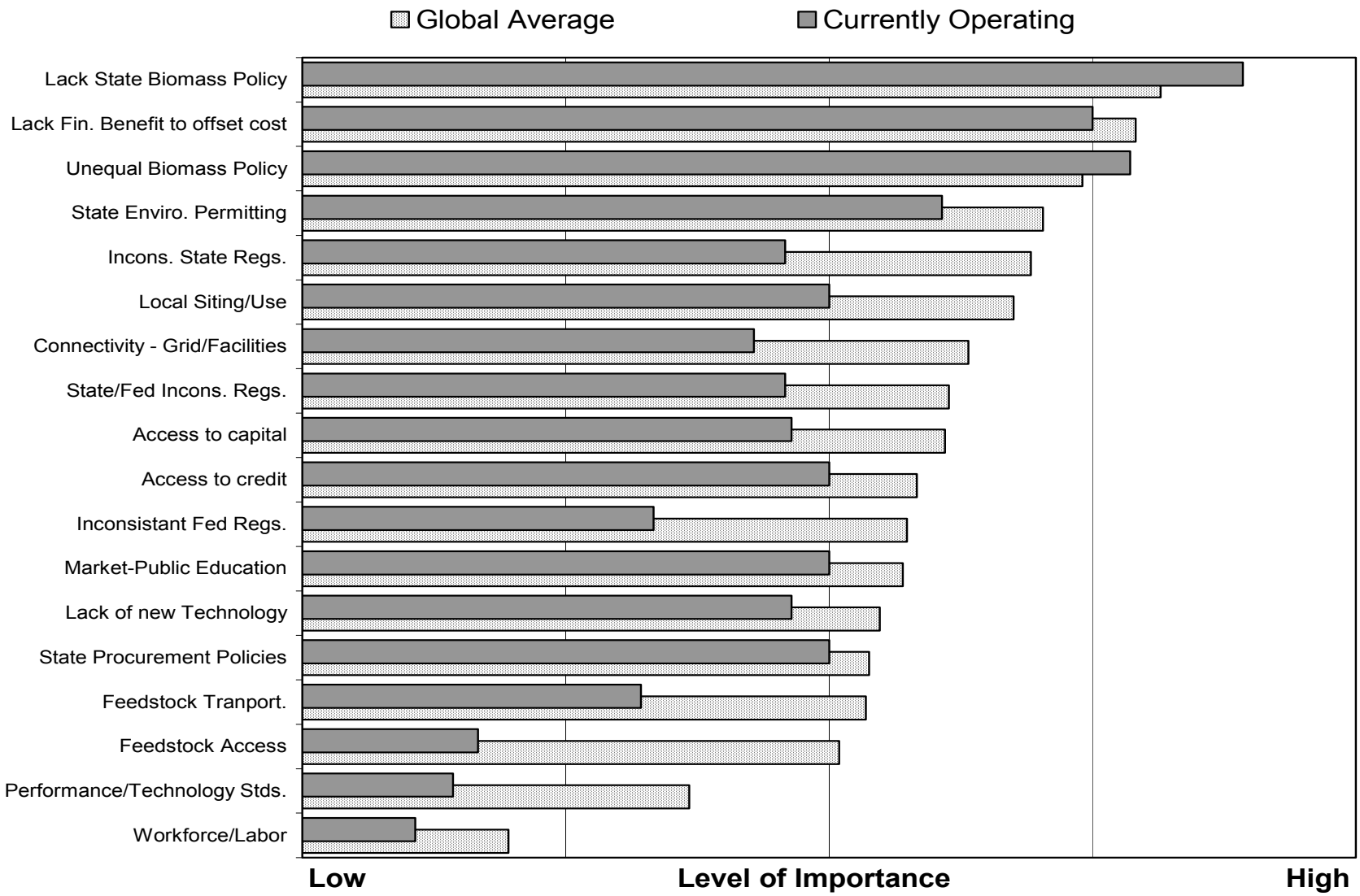

Figure A3. Policy Survey: Impediments - Rating - Currently Operating Facilities group against Global Average

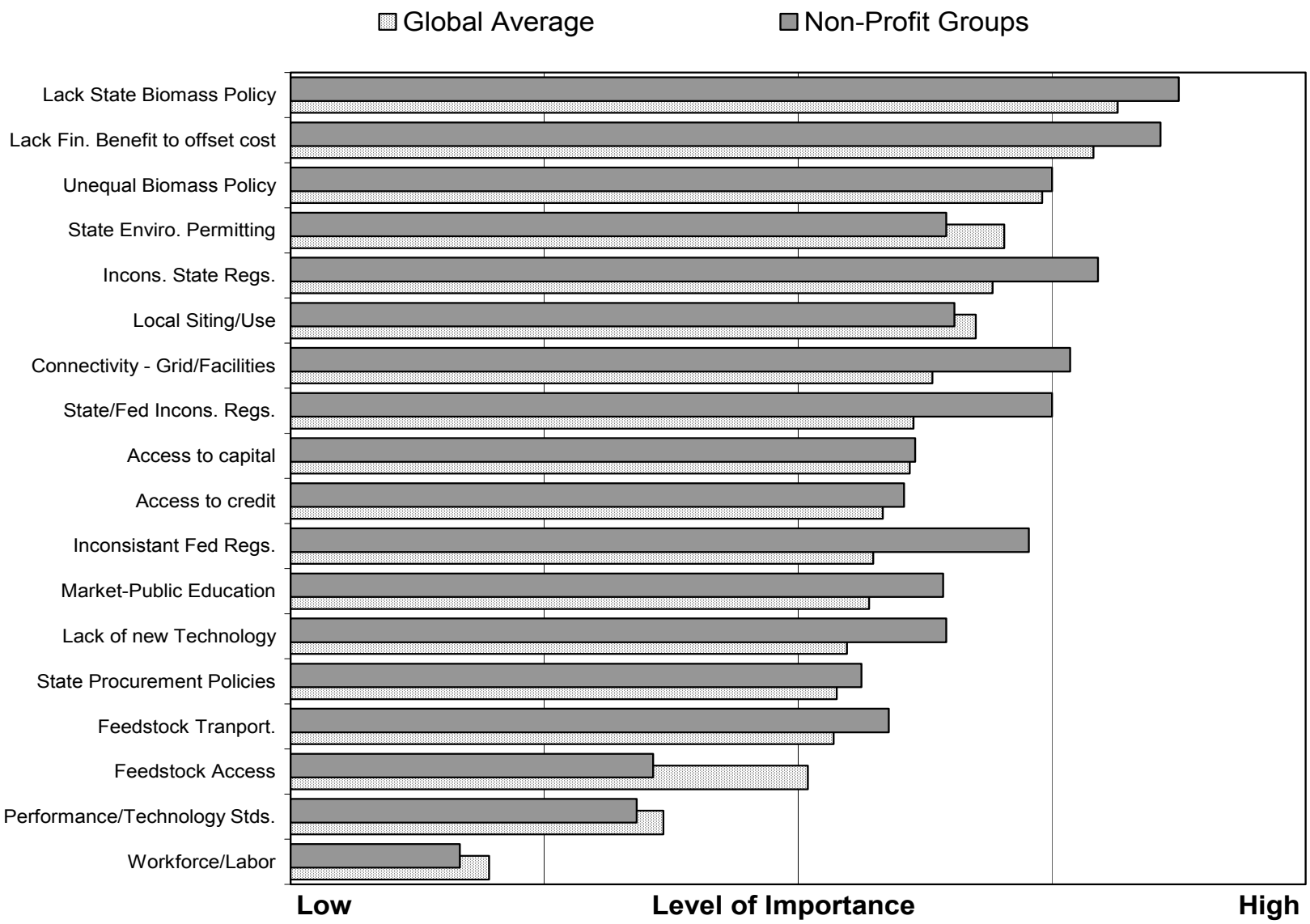

Figure A4. Policy Survey: Impediments - Rating- Non-Profit Groups against Global Average

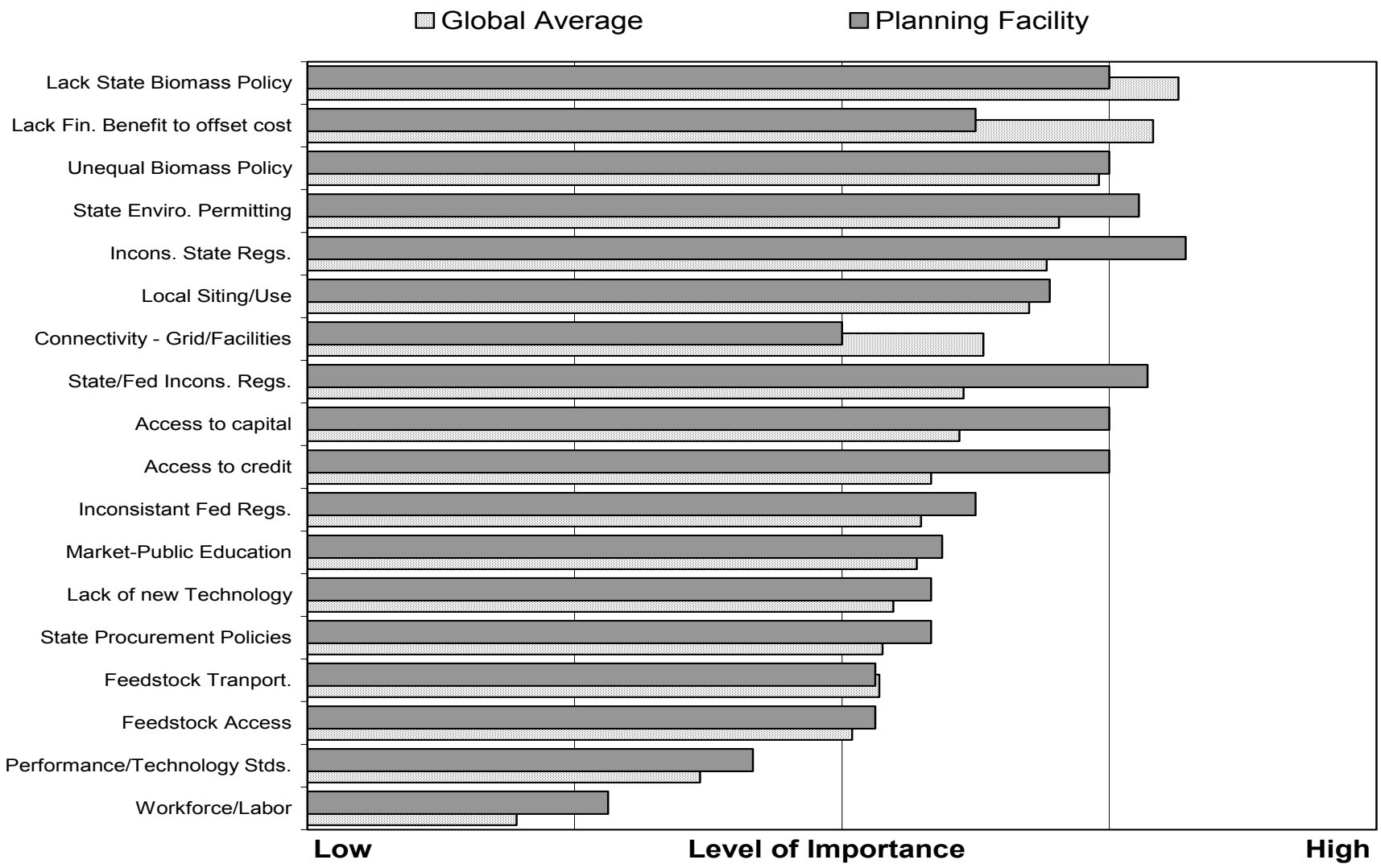

Figure A5. Policy Survey: Impediments - Rating - Those Planning a Facility against Global Average

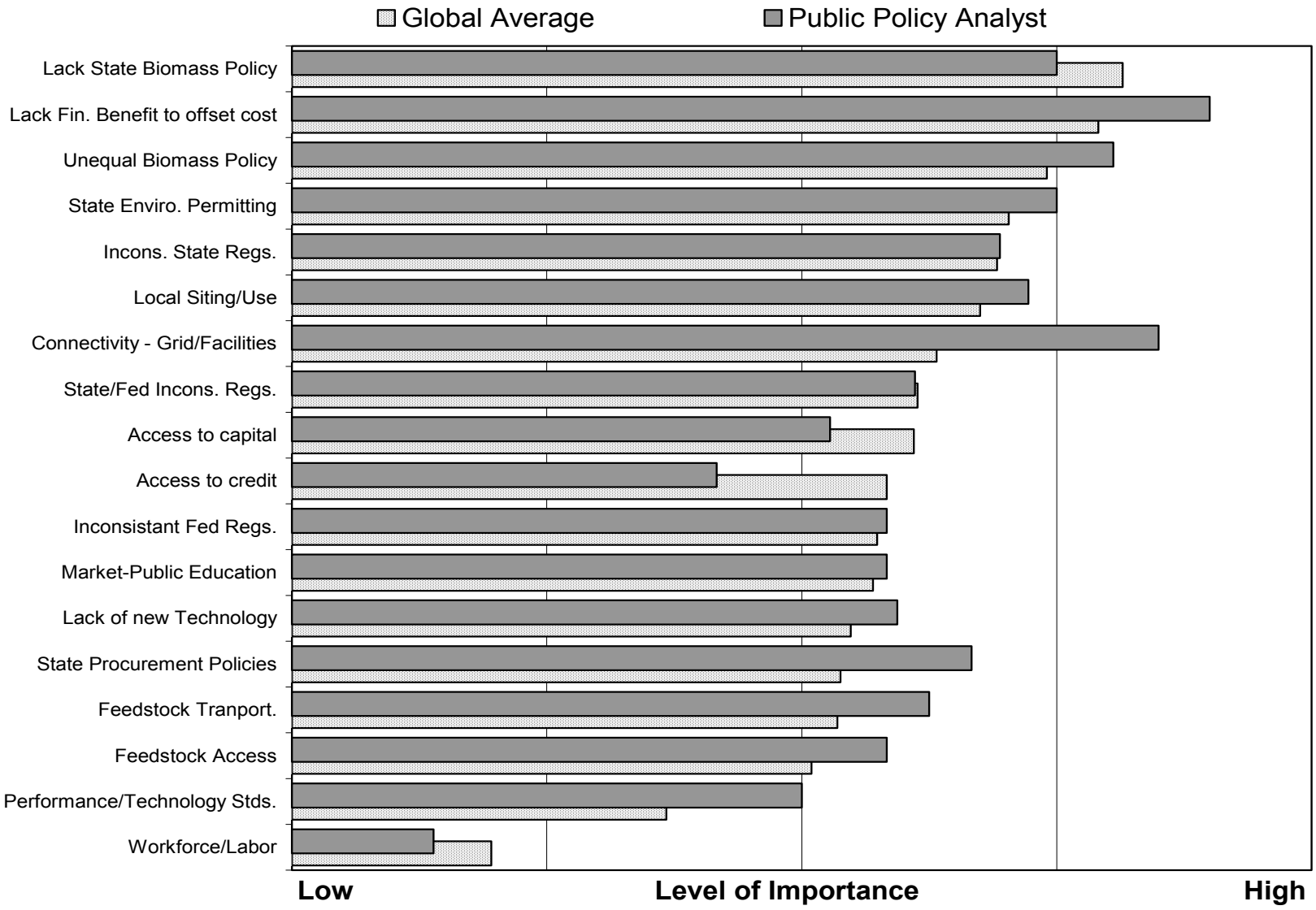

Figure A6. Policy Survey: Impediments - Rating - Public Policy Analyst group against Global Average

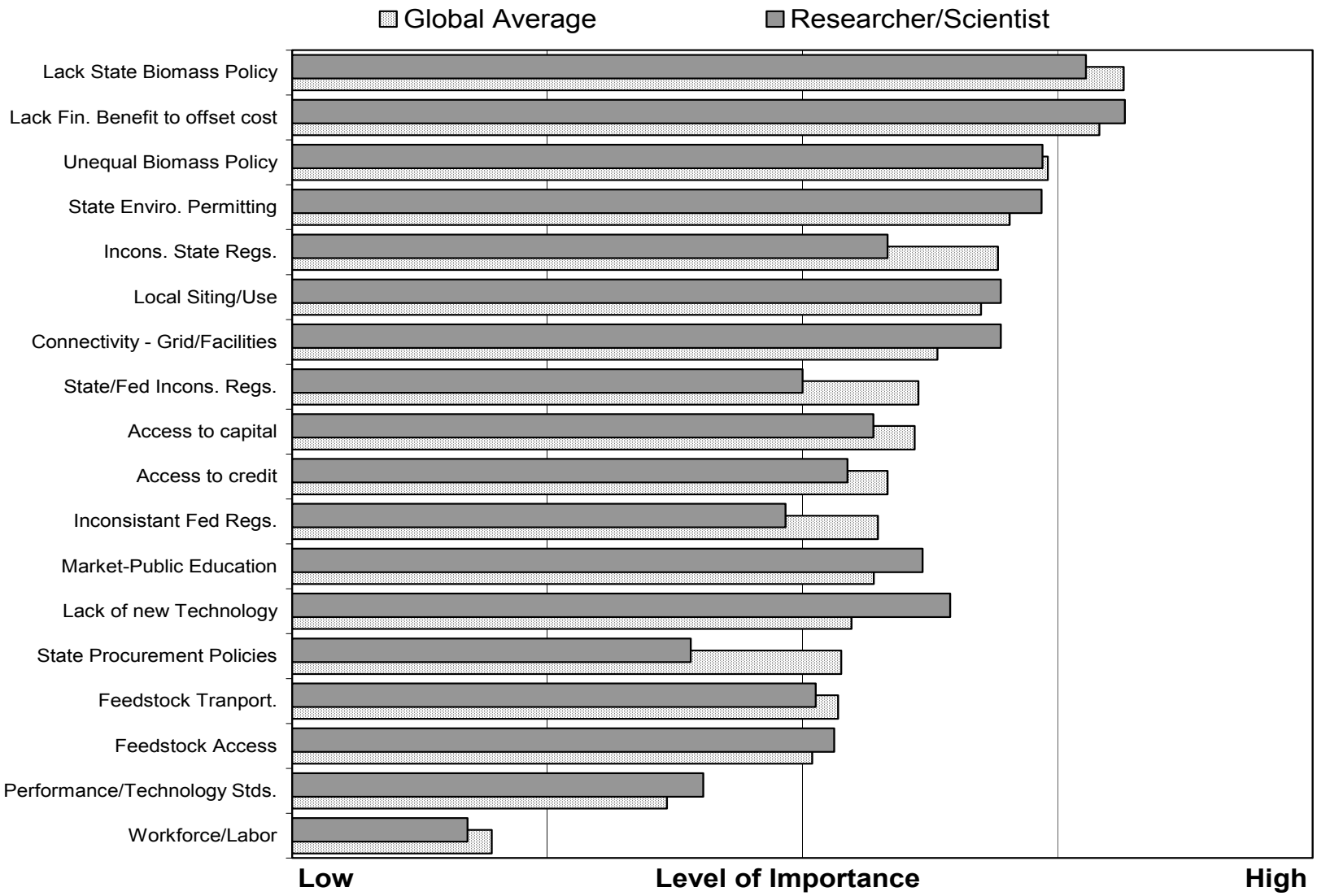

Figure A7. Policy Survey: Impediments - Rating - Public Policy Analyst group against Global Average

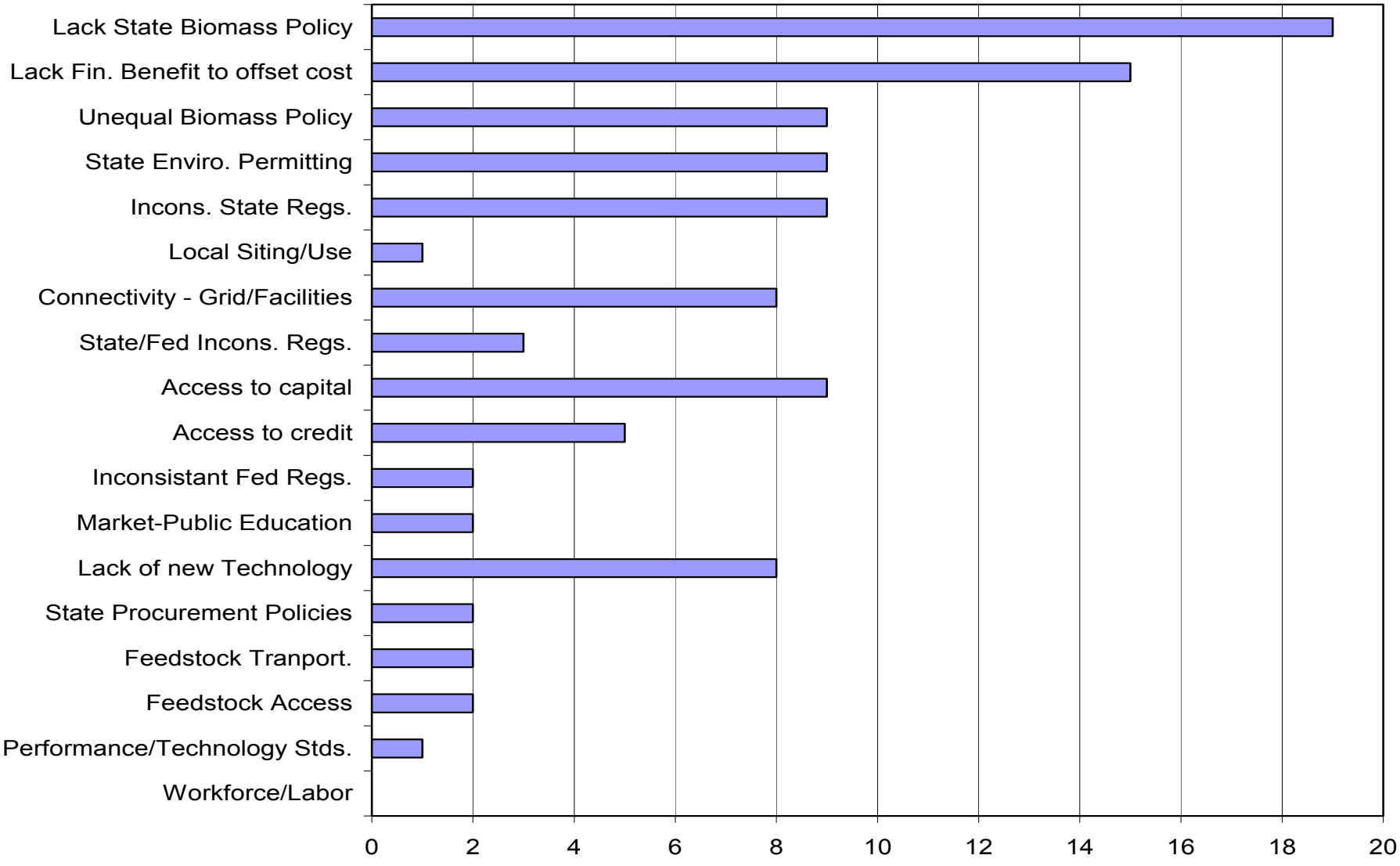

Figure A8. Policy Survey – Frequency selected as a Top Three Impediment

Table A4 - Policy Survey Section II : Financial Incentives

	Issue	Average (1=high) (5=low)	Number of Highest (1) Agreement	Number of Lowest (5) Agreement	Number of Surveys	Number of No Responses	Number of Times as "Top Three"
1	Grants, Loans, or Rebates to Producers	1.7	37	2	61	4	21
2	Grants, Loans, or Rebates to Consumers	2.8	10	11	61	10	5
3	Loan Guarantees to Producers and Suppliers	2.4	20	9	61	8	11
4	Tax Credit for Sales Tax Expenditures	2.8	12	9	61	10	6
5	Tax Credit for Research Expenditures	2.5	18	8	61	6	6
6	Tradable Tax Credit	2.1	18	3	61	10	7
7	Tradable Renewable Certifications	2.1	23	5	61	10	5
8	Depreciation Schedules	3.0	2	5	61	14	0
9	Personal Income Tax Benefits	3.2	9	12	61	15	1
10	Producer Payments	2.2	17	3	61	12	5

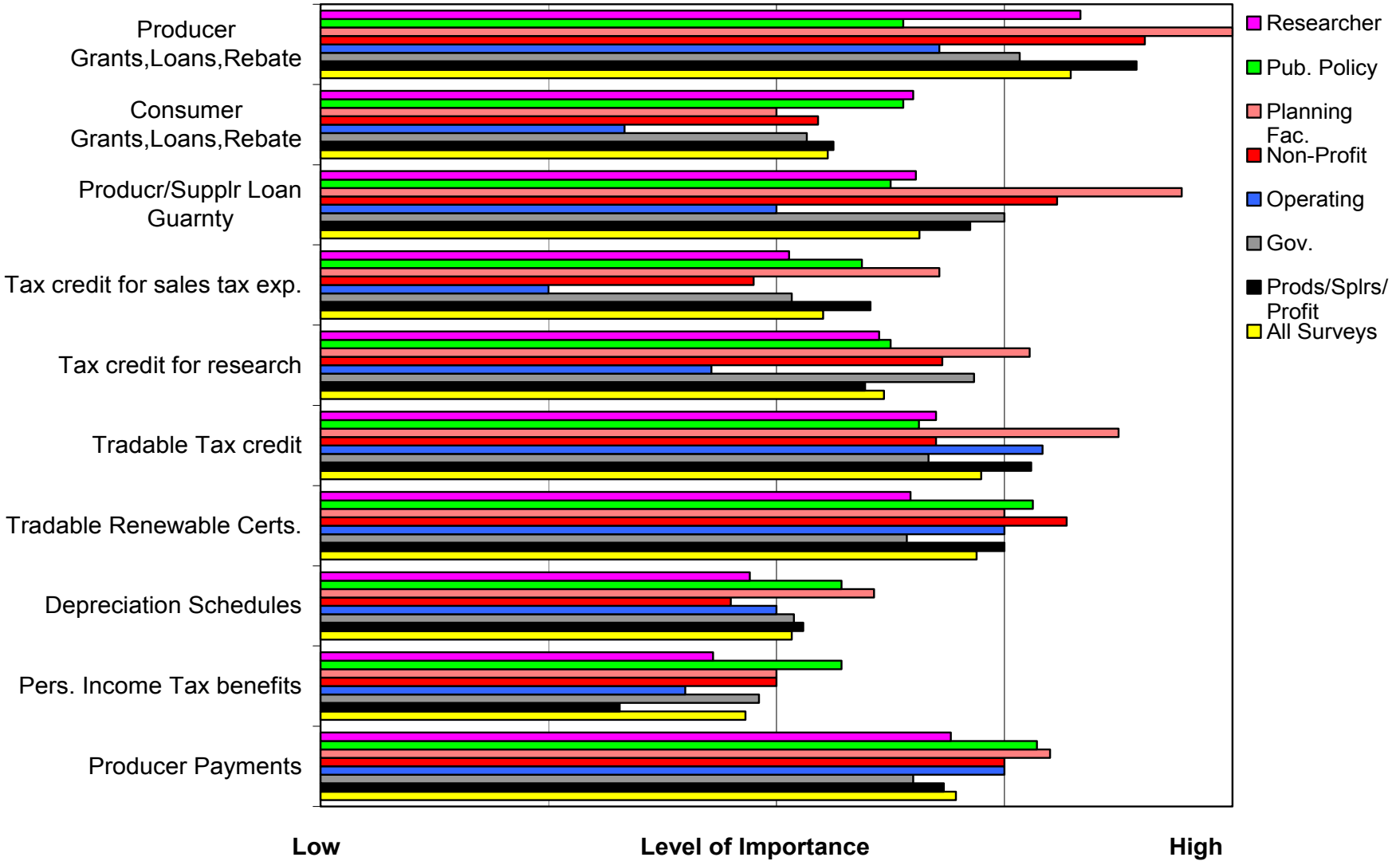

Figure A9. Policy Survey: Incentives - Average of importance by group

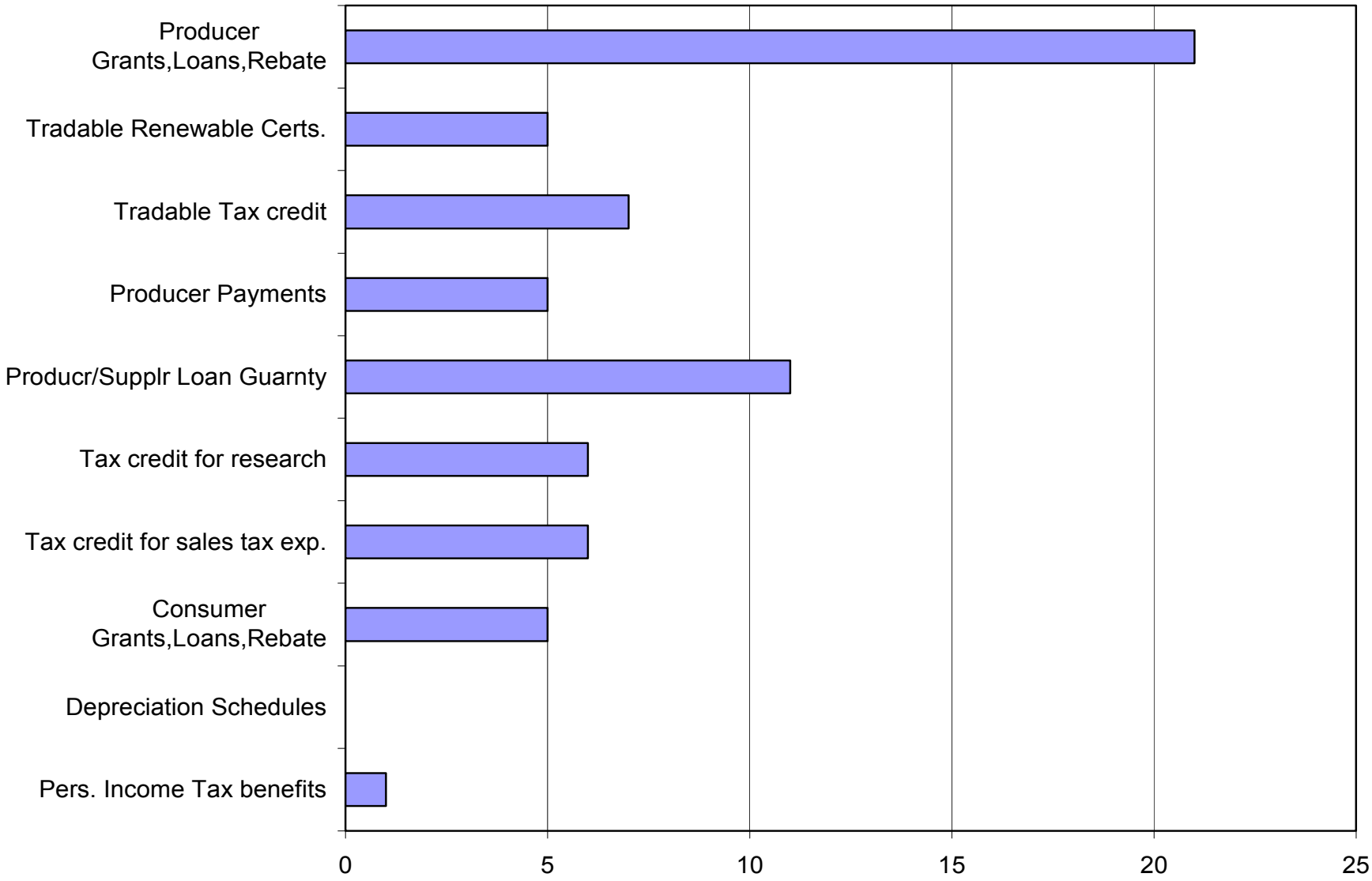

Figure A10. Policy Survey - Frequency selected as a Top Three Incentive

Table A5 - Policy Survey Section III Opportunities for Biomass Fuels, Power, and Products

	Issue	Average (1=high) (5=low)	Number of Highest (1) Agreement	Number of Lowest (5) Agreement	Number of Surveys	Number of No Responses	Number of Times as "Top Three"
1	California Renewable Portfolio Standard	1.6	36	3	65	12	18
2	Greenhouse Gas Reduction & Carbon Trading	2.2	15	3	65	8	9
3	Energy from Landfills	2.2	14	2	65	12	11
4	Landfill Diversion	2.1	19	3	65	10	19
5	Dairy Waste Management. Alternatives	2.5	9	4	65	19	4
6	Forest Fuels Reduction	1.9	28	3	65	8	22
7	State Procurement Policies for Biomass	2.3	18	5	65	11	10
8	Energy Independence	2.3	16	4	65	10	9
9	Jobs Creation	2.8	13	8	65	11	8
10	Energy Action Plan Recommendations	3.0	6	6	65	22	1

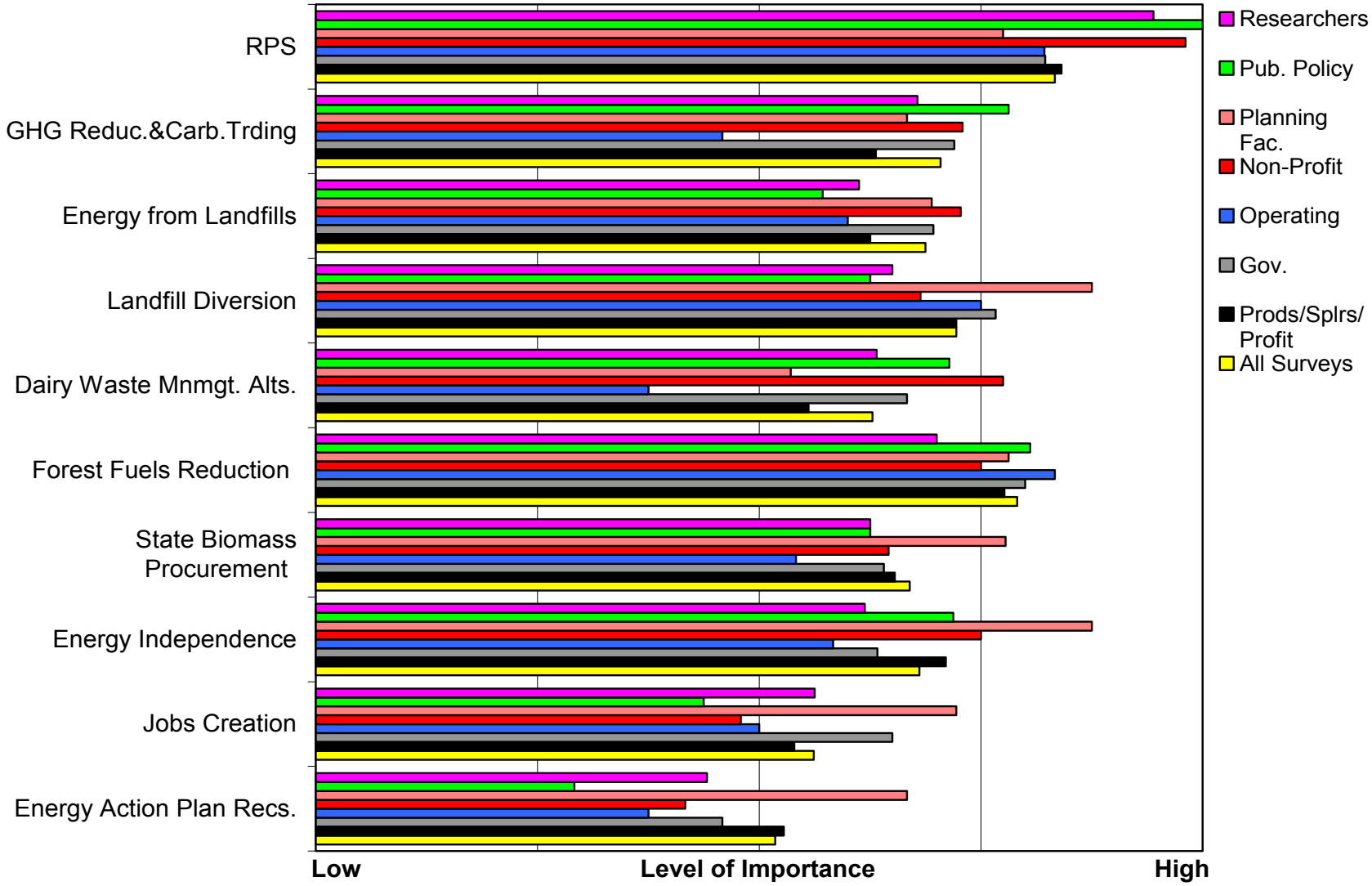

Figure A11. Policy Survey: Opportunities - Average of importance by group

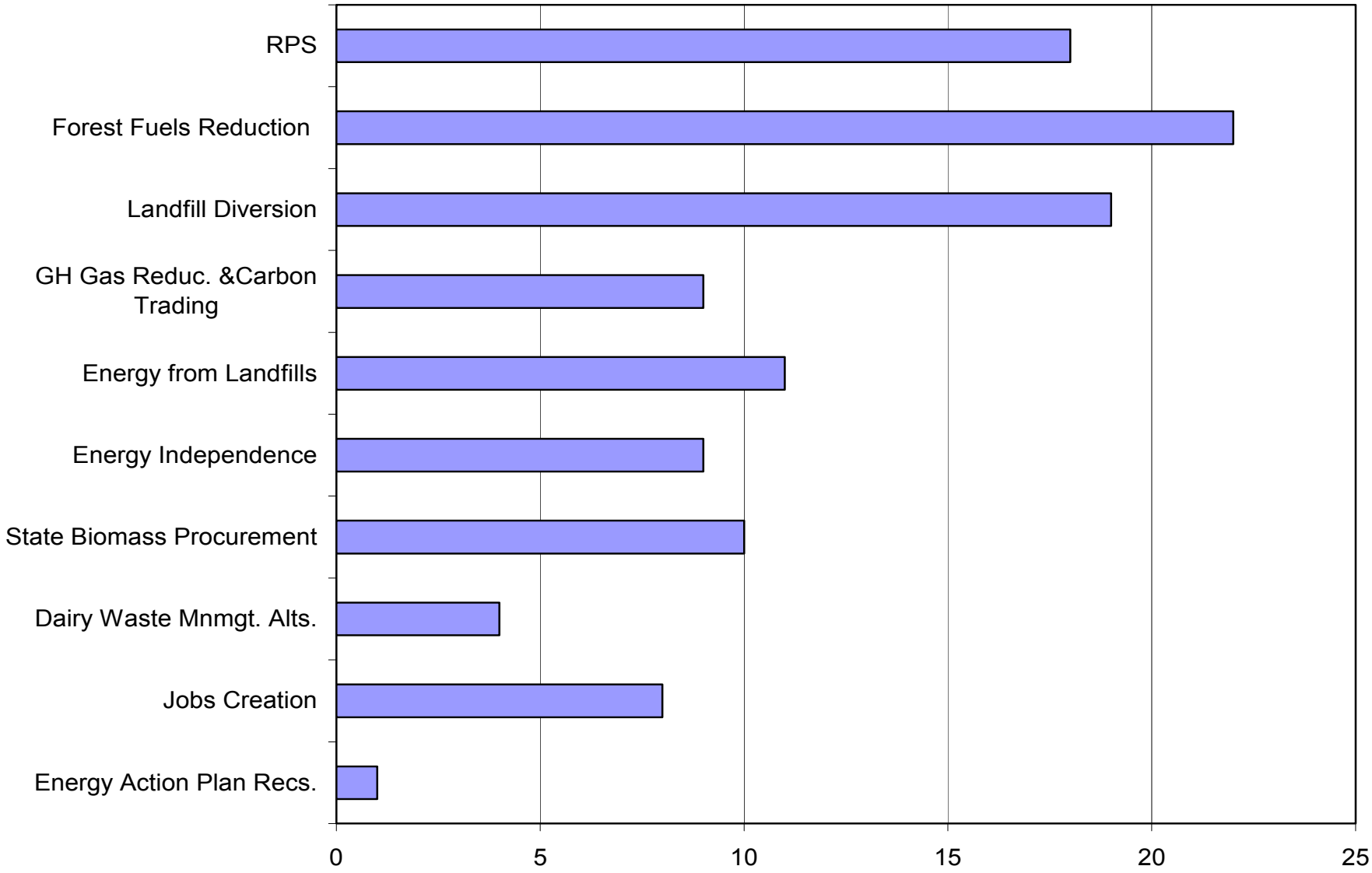

Figure A12. Policy Survey: Frequency selected as a Top Three Opportunity

Table A6 - Policy Survey Section IV : Primary Policy Objectives

	Issue	Average (1=high) (5=low)	Number of Highest (1) Agreement	Number of Lowest (5) Agreement	Number of Surveys	Number of No Responses	Number of Times as "Top Three"
1	Industry, Academia, and Government Platform	1.4	45	0	65	1	28
2	Commercialize Bio-Industry	2.3	20	3	65	4	13
3	Promote Research & Technology Transfer	1.8	31	3	65	7	20
4	Policy & Regulations Changes For Sustainable Biomass	1.5	38	0	65	7	20
5	Align State & Federal Policies	2.3	18	4	65	11	10
6	Rural Economic Development	2.1	20	4	65	12	15
7	Urban & Brownfields Revitalization	3.2	9	14	65	14	3

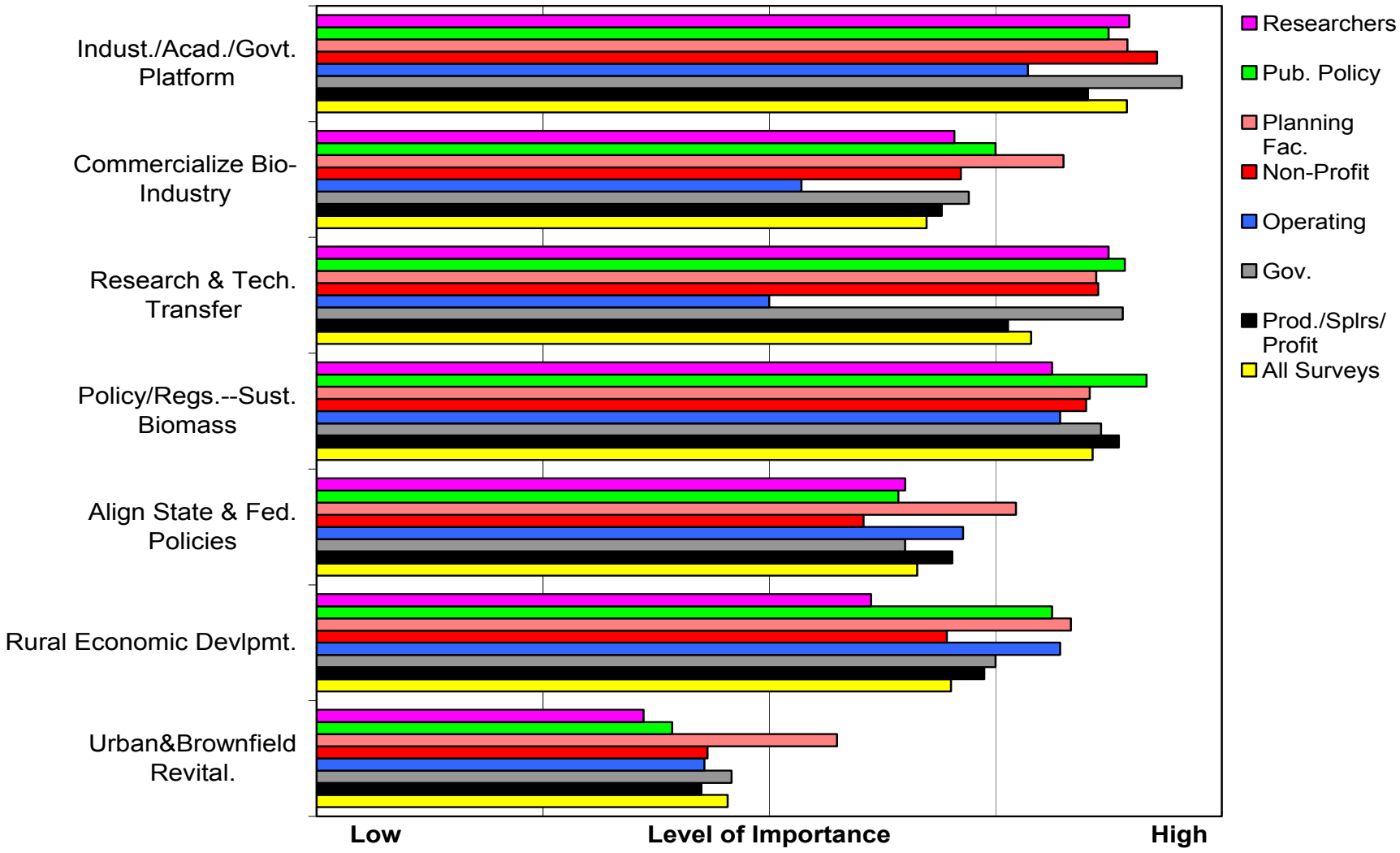

Figure A13. Policy Survey: Policy Objectives- Average of importance by group

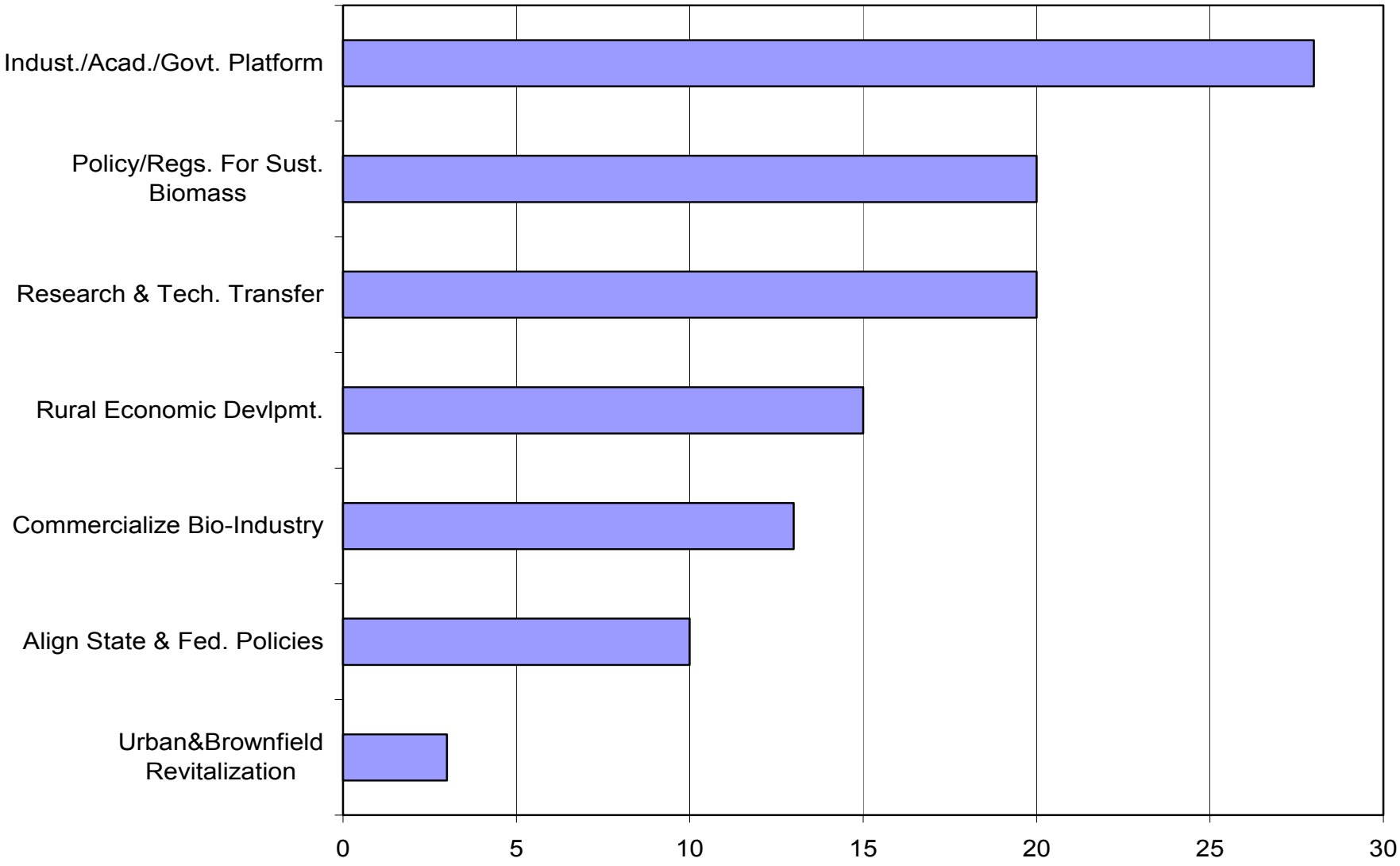

Figure A14. Policy Survey: Frequency selected as a Top Three Policy Objective

Table A7 - Research Survey Results – Feedstock Processing

Issue	Average (1=high) (5=low)	Number of Highest Agreement (1)	Number of Lowest Agreement (5)	Number of Surveys	Number of No Responses
Reduce Costs of Forest Residue	2.2	30	6	63	3
Improve Storage Technologies	3.4	4	14	63	6
Improve In-Field Processing	2.0	21	1	63	4
Develop Fuel Pre-treatment	2.5	18	3	63	5
Improve Resource Estimation	3.4	6	19	63	7

Table A8 - Research Survey Results – Conversion Technologies

Issue	Average (1=high) (5=low)	Number of Highest Agreement (1)	Number of Lowest Agreement (5)	Number of Surveys	Number of No Responses
Improve Emission Control Technologies	2.2	19	4	65	19
Develop Small/Portable Systems	2.3	22	6	65	12
Develop Biorefineries	2.3	14	3	65	16
Demo Integrated Gasifier Combined Cycle	2.4	16	3	65	12
Develop Gasification to Co-fire in GTs	2.7	12	6	65	19
Expand Biogas Systems and Feedstocks	2.1	22	4	65	14
Co-fire in Fossil Fuel Boilers	2.9	8	6	65	22
Repower Existing Facilities	2.3	12	2	65	17
Develop Multifuel Thermal Systems	2.5	10	4	65	17
Demo Cellulosic Ethanol	2.0	28	2	65	14
Improve Biodiesel/Liquid Fuel Conversion	2.7	11	6	65	14
Conduct Life-Cycle Assessments	3.0	7	8	65	19
Quantify Socio-economic Benefits	2.0	23	3	65	13
Produce Hydrogen from Biomass	2.8	11	9	65	19

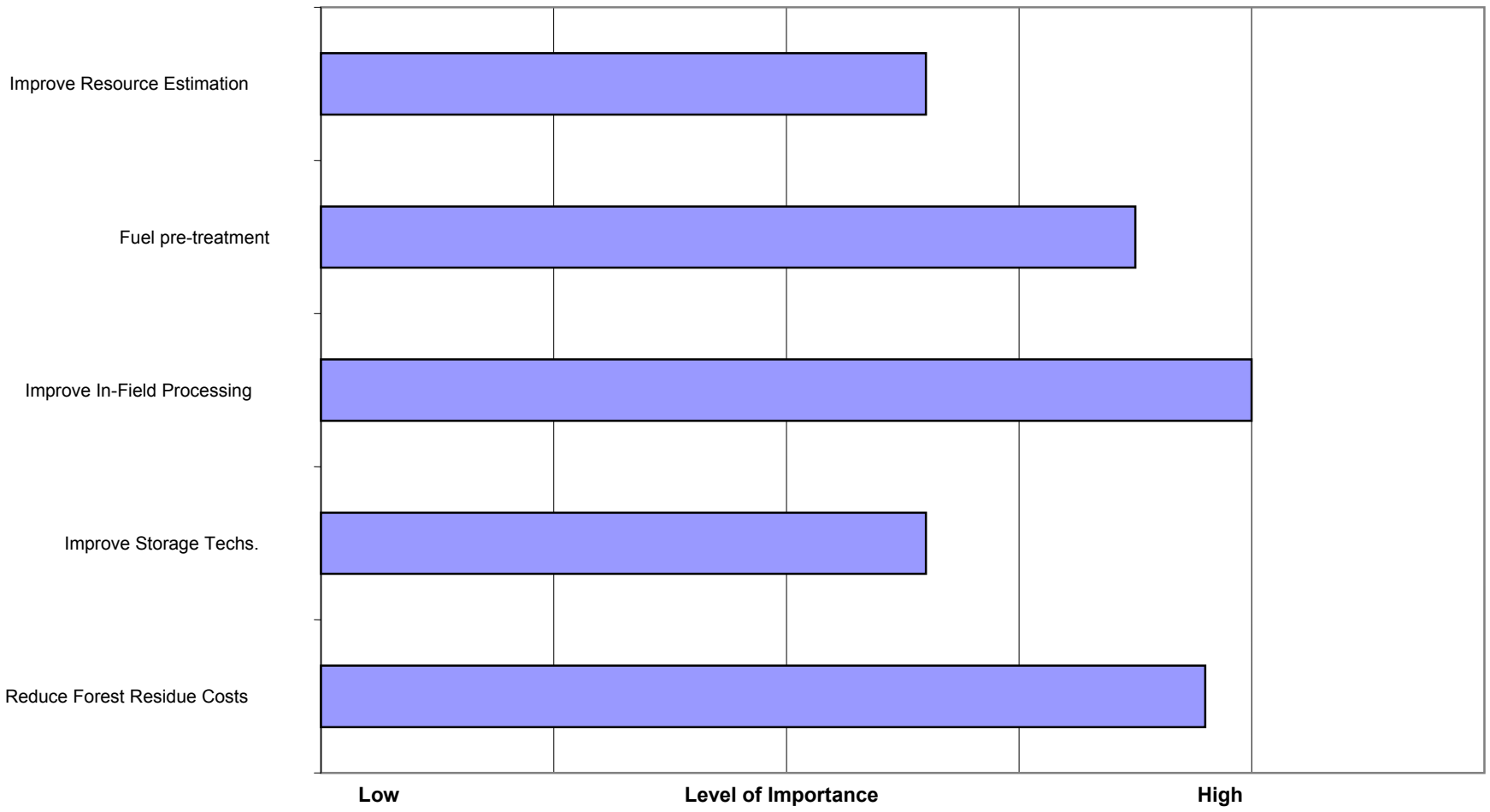

Figure A15. Research Survey : Feedstock/Processing - Average of Importance

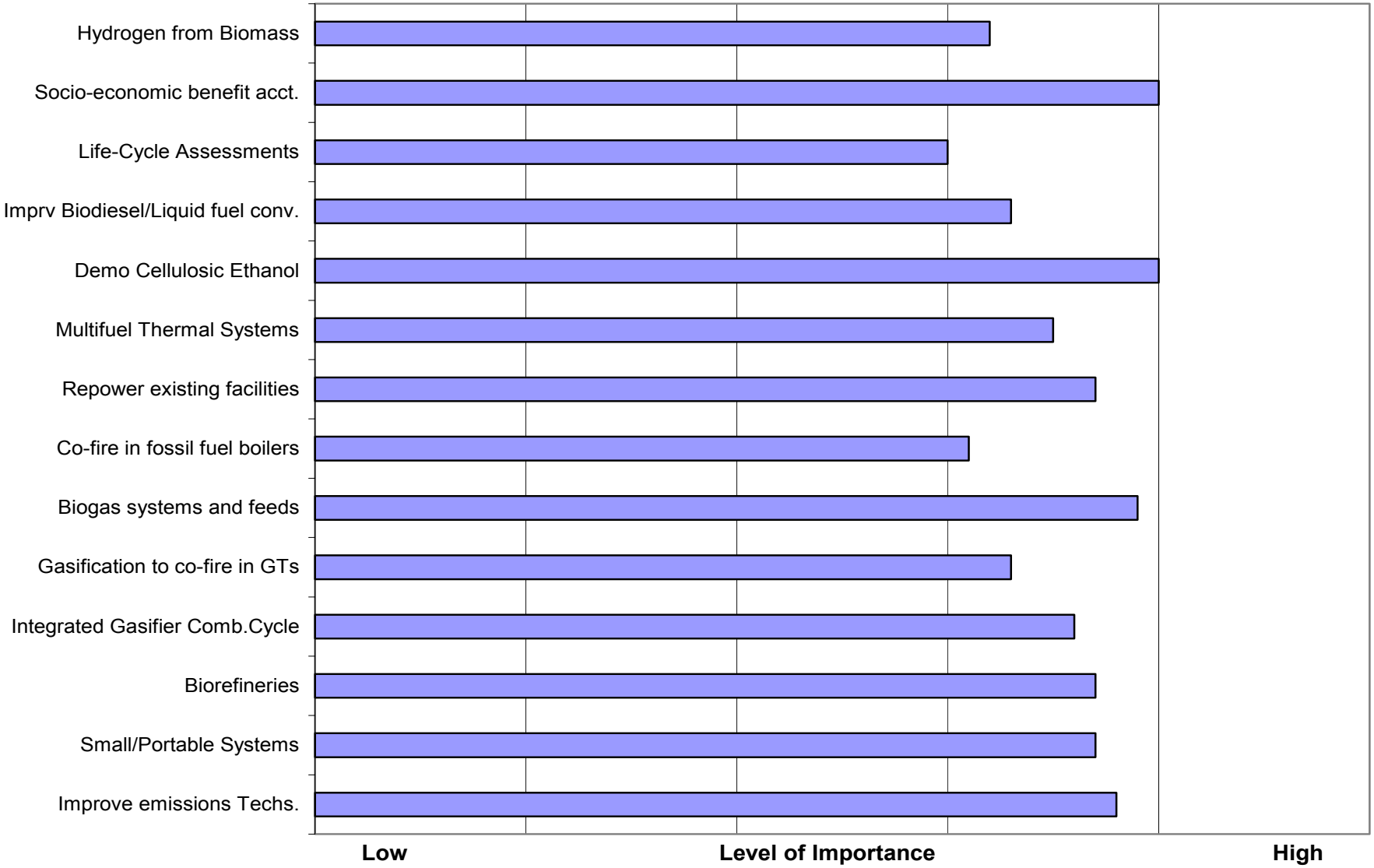

Figure A16. Research Survey : Conversion Technologies - Average of Importance (Stretched the chart some)

Analysis and Interpretation

Impediments

The highest rated impediments coincide well with the most frequently selected "top three" choices. These are:

1) lack of state biomass policy on bio-based fuels, power, and products
2) lack of quantifiable benefit to offset higher cost;
3) unequal treatment within existing policies.

Looking at the breakout of groups, overall the government sector, those planning facilities, public policy analysts and the non-profit sector rated most issues as of greater importance than the survey average, while those operating facilities, biomass producers/suppliers, and researchers rated them lower.

For the separate groups, biomass producers and suppliers felt that inconsistent regulation and state environmental permitting issues posed a greater impediment then the averages of all survey respondents. They also believed feedstock transport, quantifiable benefits, and public education were of less importance. The government sector rated feedstock access and transport and the lack of new technologies as of higher importance than the average and unequal biomass policies as lower. Participants currently operating plants gave much lower ratings to the impediments overall, but feedstock access and transport, inconsistent regulation, and interconnections with the grid were rated particularly low in importance, while the lack of state policy and unequal biomass policies rated higher than the global average of all respondents. The non-profit sector placed greater importance on inconsistent regulation and interconnection with the grid, but lower importance on feedstock access. Participants planning facilities rated inconsistent regulation and access to credit and capital as higher and interconnections and quantifiable benefits as lower. Public policy analysts rated interconnection, design and performance standards, quantifiable benefits, and state procurement policies as higher and access to credit and capital as lower. Researchers and scientists rated lack of new technology and interconnection as of higher importance and inconsistent regulation and procurement policies as lower.

Incentives

The highest rated financial incentives differ slightly from the most frequently selected top three choices. Both agree on the importance of providing grants, loans, or rebates to producers to expand the use of biomass but split with tradeable tax credits and tradeable renewable energy certificates on the average scoring higher and loan guarantees and tradeable tax credits in the top three.

For the separate groups, biomass producers and suppliers were close to the survey average on most issues but rated providing grants, loans, and rebates to producers as of higher importance and income tax credits as lower compared to the global average. The government sector varied more and rated tax credits for research higher than average and tradeable renewable certificates as lower. Participants operating facilities rated most issues lower than average with grants, loans, and rebates to producers and consumers; loan guarantees for producers and suppliers; and tax credits for sales tax and research as significantly lower. The non-profit sector rated grants, loans, and rebates to producers; loan guarantees to producers and suppliers; and tradeable certificates as of higher importance and depreciation schedules as lower. Participants planning facilities rated most incentives as of higher importance than the survey averages with grants, loans, and rebates to producers; loan guarantees; and all tax credits particularly high. Public policy analysts rated grants, loans, and rebates to consumers; tradeable renewable certificates; income tax benefits; and producer payments as higher and grants, loans, and rebates to producers and tradeable tax credits as lower. Researchers and

scientists rated grants, loans, and rebates to consumers as higher and tradeable renewable certificates as lower than average.

Opportunities

The highest rated opportunities for continued use and expansion of biomass coincide well with the top three choices but in reverse order. These are:

1) California renewable portfolio standard;
2) forest fuels reduction for fire hazard mitigation; and
3) diversion of waste from landfills.

For the separate groups, biomass producers and suppliers coincided well with the global averages. The government sector placed greater importance on jobs creation than the survey average. Facility operators once again tended to rate issues appreciably lower than the averages with greenhouse gas reduction; dairy waste management alternatives; state procurement; and Energy Action Plan (EAP) recommendations particularly low. The non-profit sector rated the renewable portfolio standard (RPS) and dairy waste management alternatives as of higher importance and jobs creation as lower than the global average. Individuals planning facilities rated landfill diversion; state procurement policies; energy independence; jobs creation; and the EAP recommendations higher and the RPS and dairy waste management alternatives lower. Public policy analysts rated RPS, greenhouse gas reductions, and dairy waste management alternatives as higher and landfill issues, jobs creation and EAP recommendations as lower than the survey average. Researchers and scientists rated RPS as of higher and landfill diversion of lower importance than average.

Policy Objectives

The highest rated policy objectives for the Collaborative coincide well with the top three choices. They are:

1) establish a platform for industry, academia, and government to work together on biomass issues;
2) determine policy and regulatory changes necessary to remove barriers to a sustainable biomass system; and
3) promote research and transfer of technologies.

The top-rated policy objective (establish a platform . . .) was given the highest level of importance of any issue in all categories of the Policy Survey. It also was selected the most frequently as a "top three" choice.

For the separate groups, biomass producers and suppliers agreed well with the survey averages. The government sector was close to the survey averages but placed greater importance on establishing a platform and promoting research and technology transfer. Facility operators rated enhancing rural economic development as higher and establishing a platform; promoting commercialization; and promoting research and development as significantly lower than the survey average. The non-profit sector rated aligning state and federal policies lower than the average but agreed well with the other issue averages. Individuals planning facilities rated research and technology transfer; policy and regulatory changes; and rural economic development higher and brownfield revitalization lower than the survey averages. Researchers and scientists tended to rank policy issues lower than average with rural development and brownfields revitalization lowest.

Deviation from the average was most pronounced for facility operators, followed by policy analysts, the non-profit sector and facility planners. The other groups – producers and suppliers, government

sector, and researchers - are also the larger groups and would be expected to influence the average value more strongly.

Issues of Highest Importance by Group

Operators of facilities rated highest the lack of state policy on biobased fuels, power, and products, followed in order by need for forest fuels reduction, regulatory and policy changes to remove barriers, and California RPS.

Producers and suppliers rated grants, loans, and rebates to producers highest overall, followed by California RPS, establishing a platform to work together, and environmental permitting issues.

Policy Analysts rated the California RPS highest followed by need for regulatory and policy changes to remove barriers, lack of quantifiable benefits, and promoting research and technology transfer.

Government employees rated establishing a platform to work together as highest, followed by promoting research and technology transfer, lack of quantifiable benefits and lack of state policy.

Judging from some of the differences in the level of importance awarded to the issues by the different groups, there appears to exist a need for education and communication to develop a full understanding of how the different issues affect the varying interest groups.

Overall, the survey responses give a strong signal that all elements of the Collaborative feel that California lacks a coherent state policy supporting the biomass industries, that some form of financial support will be needed for at least the short-term, that the environmental and societal benefits must be quantified accurately to justify the needed support, further research and development will help the industry evolve, and a platform such as the Collaborative is a viable way to achieve these goals.

California Biomass Collaborative - Policy Survey

The Policy Committee of the California Biomass Collaborative, as part of its first year activities, is developing a work plan including policy objectives. These are intended to lead to legislative and regulatory recommendations that will support the continued and expanded use of biomass for energy generation, production of biobased products and the more efficient reuse of waste for societal benefit. Below are a series of inquiries which will assist the Policy Committee in focusing its work.

Greatest Impediments to Continued Use and Expansion of Biomass

Please rate the following from 1 (highest agreement) to 5 (lowest agreement). Add your own ideas on the blank lines. After individually rating each impediment, please **circle the top three** impediments.

__ Inconsistent state regulatory requirements.

__ Inconsistent federal regulatory requirements.

__ State and federal requirements are inconsistent with each other.

__ Unequal treatment of biomass within existing renewable energy policies.

__ State environmental permitting issues.

__ Local siting and use issues.

__ Transportation of feedstocks.

__ Access to working capital.

__ Access to credit for capital expenditures.

__ Workforce and labor-related issues.

__ Lack of access to new and/or innovative technologies.

__ Interconnections with the energy grid and other existing facilities.

__ Market acceptance and/or public education.

__ Lack of state policy on biobased fuels, power and products.

__ Construction and design standards including performance v. technology standards.

__ Lack of quantifiable financial benefit to offset higher costs for biomass.

__ State procurement policies.

__ Access to biomass feedstocks and fuels.

__ _____

Specific Key Regulations that Must Be Addressed

Please specify one to four specific laws, regulations or activities that must be addressed in a comprehensive biomass policy to ensure the continued use and expansion of biomass fuels, power and products.

1. _____
2. _____
3. _____
4. _____

Financial Incentives

Please rate the following incentives for expanding the use of biomass fuels, power and products from 1 (highest agreement) to 5 (lowest agreement). Add your own ideas on the blank lines. After individually rating each incentive, please **circle the top two** incentives.

__ Grants, loans or rebates to producers.

__ Grants, loans or rebates to consumers.

__ Loan guarantees to producers and suppliers.

__ Tax credits against sales tax expenditures.

__ Tax credits against research expenditures.

__ Tradable tax credits.

__ Tradable renewable energy certificates.

__ Depreciation schedules.

__ Personal income tax benefits for use of biomass.

__ Producer payments.

Additional Space for Financial Incentives

__ _____

__ _____

__ _____

__ _____

Opportunities for the Continued Use and Expansion of Biomass Fuels, Power and Products

Please rate the following opportunities for expanding the use of biomass fuels, power and products from 1 (highest agreement) to 5 (lowest agreement). Add your own ideas on the blank lines. After individually rating each opportunity, please **circle the top three** opportunities.

__ California Renewable Portfolio Standard.

__ Growing public interest in greenhouse gas reductions and carbon trading systems.

__ Energy generation from landfills.

__ Diversion of waste from landfills.

__ Dairy industry's interest in alternatives to open lagoon storage of wastewater and runoff.

__ Fire hazard mitigation in wildlands and urban interface areas.

__ State procurement policies and opportunities for aggregate purchasing of biobased fuels, power and products.

__ Growing public interest in energy independence.

__ Job creation through expansion of biomass industries and supporting businesses.

__ Recent completion of the Energy Action Plan and accompanying research and recommendations.

__ _____

__ _____

Primary Policy Objectives of the Collaborative

Please rate the following policy objectives for the CBC from 1 (highest agreement) to 5 (lowest agreement). Add your own ideas on the blank lines. After individually rating each objective, please **circle the top three.**

__ Establish a platform for industry, academia, government, and others to work together on issues relating to biomass.

__ Promote the commercialization of biobased industries.

__ Promote research and transfer of technologies related to biobased fuels, power and products.

__ Determine regulatory and policy changes necessary to remove barriers to a sustainable biomass system.

__ Align state and federal policies on renewable energy including biomass.

__ Enhance opportunities for rural economic development through agricultural and forestry based bioindustries.

__ Enhance opportunities for urban revitalization through remediation and redevelopment of brownfields.

__ _____

__ _____

Information about You

Please check all categories that describe you. Type(s) of biomass feedstock(s) used: _____

__ Producer
__ Supplier
__ Residential consumer
__ Business consumer
__ Researcher/Scientist
__ Public policy analyst
__ Government
__ Non—profit private sector
__ For-profit private sector
__ Currently operate a facility
__ Planning a new facility
___Educator
___ Other – please specify:
_____

Thank You – Your Investment is Valuable

Thank you for your time in completing this survey. If you would like to continue to participate in the development of a biomass policy for California please add your name and contact information below.

Name: _____
Email: _____ Phone: _____

Please return survey form by **end of lunch at the Forum**. If you wish to return the survey later, please send the completed form to:

California Biomass Collaborative

Department of Biological and Agricultural Engineering

University of California

1 Shields Avenue

Davis, CA 95616

fax: 530 752 2640

email: biomass@ucdavis.edu

California Biomass Collaboration Research Survey:

Please rate the following potential California biomass research topics from 1 (highest priority) to 5 (lowest priority). Add your own suggested research topics on the blank lines below the list provided.

Feedstock/Processing

_____ Reduce cost of harvesting and transporting forest residues

_____ Improve storage technologies

_____ Improve in-field processing technologies

_____ Develop fuel pre-treatment processes

_____ Improve methods to estimate biomass resources

Conversion Technologies

____ Improve pollution and emissions control technologies

____ Develop small, portable conversion units

____ Develop biorefineries for energy and high value products

____ Demonstrate biomass integrated gasification combined-cycle systems

____ Develop gasification for co-firing with fossil fuels in gas turbines

____ Expand use of biogas (new feedstocks, new energy conversion technologies)

____ Facilitate co-firing with fossil fuels in boilers (coal, natural gas)

____ Retrofit or repower existing biomass combustion plants to improve efficiency & reduce emissions

____ Develop multifuel capabilities for thermal conversion systems

____ Demonstrate ethanol production from cellulosic biomass

____ Improve conversion processes for biodiesel and other liquid fuels

____ Conduct lifecycle assessments

____ Develop better methodologies to account for social and economic benefits

____ Develop systems to produce hydrogen from biomass

Suggested research:

_____

_____

_____

_____

Thank you for your time completing this form.

Please return survey form by the **end of lunch at the Forum.** If you wish to return the survey later, please send the completed form to:

California Biomass Collaborative

Department of Biological and Agricultural Engineering

University of California

1 Shields Avenue

Davis, CA 95616

Phone: (530) 752-2640 Email: biomass@ucdavis.edu